United States
Department of
Agriculture

Forest
Service

January 2020

Threemile Restoration

and

Resiliency Project

Environmental Assessment

January 21, 2020

Ashland Ranger District

Custer Gallatin National Forest

PURPOSE AND NEED FOR ACTION

Introduction

The Ashland Ranger District, Custer Gallatin National Forest is proposing the Threemile Restoration and Resiliency Project to manage this fire adapted ecosystem towards a mosaic of forest, woody draw, and grassland vegetation that restores and improves ecosystem resiliency. The intent would be to achieve this outcome through application of commercial timber harvest, non-commercial treatments, and prescribed burning.

By creating resilient landscape conditions, the Forest Service would be able to manage this portion of the National Forest now and into the future so that it reduces the severity of effects from large disturbances (e.g. fire and beetle mortality,) and meets the diverse needs of people; including the demand for rangeland, forest products, hunting and other forms of recreation, aquatic and terrestrial habitat, and other multiple uses of the National Forest (Multiple Use Sustained Yield Act (1960); National Forest Management Act (1976)).

The Forest Service has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), the Land and Resource Management Plan for the Custer National Forest (hereafter Forest Plan) 40 CFR 1508.9, 36 CFR 220.7, and other relevant federal and State laws and regulations. This EA discloses the project's foreseeable environmental effects for consideration in determining whether or not to prepare an Environmental Impact Statement based on the significance of those effects given their context and intensity. The reports cited in this EA and additional project documentation can be obtained from the project file located at the Supervisor's Office in Bozeman, Montana.

Project Area

The Threemile Restoration and Resiliency Project Area encompasses approximately 32,924 acres of National Forest System (NFS) lands. It is bounded on the north, south, and west sides by non-NFS lands and NFS lands to the east. There is 1,689 acres of non-NFS lands within the Project Area boundaries. See Map 1 (Vicinity Map), Map 2 (Treatment Units Alt. A), and Map 3 (Treatment Units Alt. B) in Appendix A.

The Project Area is characterized by several drainages with forested north slopes, open grassland ridge-tops, south slopes with scattered to moderately stocked ponderosa pine stands, and riparian/woody draw ecosystems. Typical vegetation is dependent on aspect and topographic position. Timbered north slopes are dominated by ponderosa pine, Idaho fescue, and chokecherry or snowberry. Vegetation on residual uplands is generally dominated by western wheatgrass, green needlegrass, and Idaho fescue with silver sagebrush and big sagebrush scattered throughout. South slopes are dominated by ponderosa pine, bluebunch wheatgrass, little bluestem, and scattered skunkbush sumac. Green ash, chokecherry, and several other woody deciduous species dominate the riparian/woody draw ecosystems.

The project area is not located within or adjacent to any roadless areas analyzed in the Roadless Area Conservation; Final Rule (*36 CFR Part 294, Special Areas; Roadless Area Conservation, Final Rule)*, the Forest Plan FEIS, Appendix C (USDA 1986), or Roadless Area Resource

Evaluation (RARE II, 1979). There are three roadless areas on the District, but these lay approximately from 7 to 15 air miles to the northwest and west of the project area.

The general location of the Project Area is approximately nine air miles southeast of Ashland, Montana in the Home Creek, Threemile Creek, and Tenmile Creek drainages. The project area consists of lands located in Powder River County, Montana. Refer to Maps 1, 2 and 3 in Appendix A. The proposed project is located on National Forest System lands in all or parts of: T3S, R46E, Sections 14-17 and 19-36; T4S, R46E, Sections 1-36; T4S, R47E, Sections 7 and 31; T5S, R46E, Sections 1-4, 11th Guide Meridian East.

Desired Condition

Wildfires across the District totaling 380,000 acres- a portion of these being uncharacteristically large and severe- in the last 20 years. Of those acres, 290,000 burned in 10 large fires from 2000 to 2017. Since the Ashland Post Fire Assessment 2014 was completed, there have been an additional 107 smaller fires (0-1000 acres in size) that burned roughly 5,000 acres. These fires have reduced the extent of forest cover across the district. Figures 1 and 2 illustrate the changes in forest cover since 1995 to 2012 post fire. At the landscape level, the long-term Forest Plan Forest-wide and Management Area direction is to have a mosaic of resilient forest cover and re-establish forest cover across the Ashland District where it has been lost due to extensive wildfire mortality. As noted, this is consistent with the Forest Plan, as well as the Multiple Use Long-term Sustained Yield Act (1960), and the National Forest Management Act, as amended (1976).

Purpose and Need for Action

The purpose of the Threemile Restoration and Resiliency Project is the "why here, why now" question. Figure 1 depicts the change in forested cover from 1995 to 2012. Figure 2 is a bar graph representation of that change. When comparing forest cover change images of the District from 1995 to 2012, along with the bar graphs that show the decline of forest cover from 1995 to 2012 (184,700 acres decline in forest cover in 1995, 164,700 acres in 2005, and 110,600 acres in 2012), there are large tracts of forest and grassland that have burned, and some areas that, remarkably, have not. A portion of the southwest part of the project area and the very northeast part of the project area have not yet had a large stand replacing wildfire. These circumstances presents opportunities to proactively conduct restoration and resiliency/conservation activities in the Threemile project area. Existing and desired conditions support the need to:

- Restore ponderosa pine ecosystems towards a more heterogeneous forested landscape with a diverse age and size structure (including old growth), understory structure and composition, patch size, and pattern that are resilient to natural disturbances (e.g. fire, insect/disease, climate change).
    - Promote ponderosa pine.
    - Within the project area, make progress changing the fire regime from low frequency high intensity towards one of higher frequency and lower intensity. This is discussed in some detail in the Ashland Post Fire Landscape Assessment 2014 and helps in understanding fire's role on the landscape (pp. 40 and 41).
    - Lessen the potential spatial extent and intensity of disturbances (such as high intensity wildfire and high mortality from beetles.

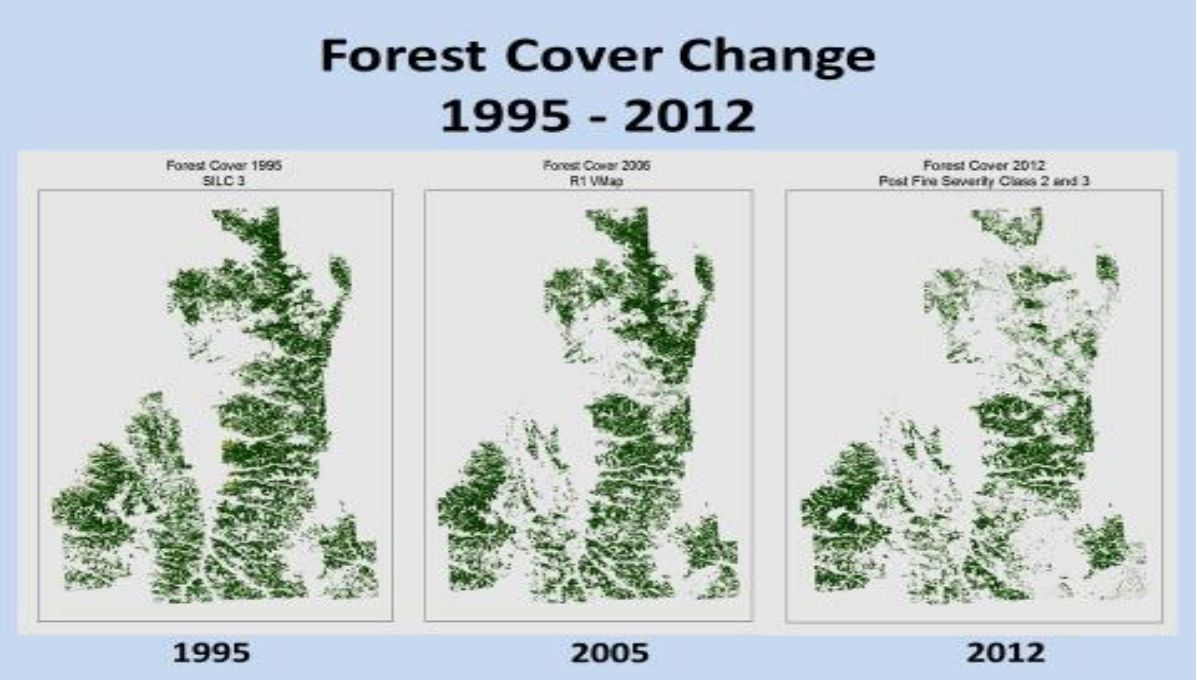

Figure 1. These images illustrate the change in forest cover from 1995 to 2012 resulting from several large fires during that time period. Using Satellite Image Land Classification (SILC 3) as a baseline, and 2009 R1 Vmap as a comparison, forest cover declined from 40 percent to 38 percent between 1995 and 2005. As shown in Figure 2 a more dramatic change occurred between 2005 and 2012 where forest cover has declined from about 40 percent in 1995 to 25 percent in 2012. In 1995 the Forest pattern was relatively contiguous across the District. In 2005 and 2012 the pattern is less contiguous as depicted by the large areas of non-forest in the north half, south-central and southeast parts of the district.

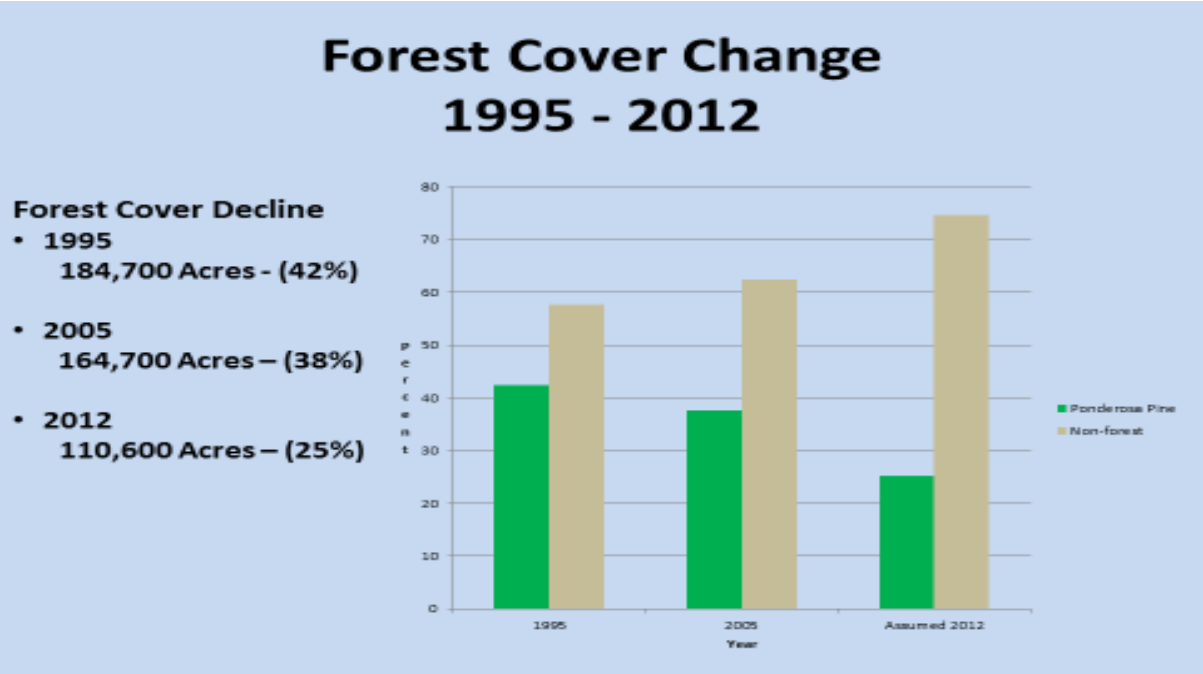

Figure 2. Acres of forest cover change from 1995 to 2012. See also the notes for Figure 1.

- Reduce fuel loads to enhance fire suppression capabilities by modifying fire behavior in the Threemile Restoration and Resiliency project area.
- Use the values at risk identified in the Powder River Wildfire Protection Plan (PRWPP, 2016) to help in the planning of vegetation management treatments on NFS lands.
- Provide wood products to contribute to employment and industry in local communities and help support the sustainable supply of timber from National Forest System lands.
- Manage to maintain or improve long-term diversity and quality of habitat for Management Indicator Species (MIS) and selected species as identified in the Forest Plan (such as whitetail deer, mule deer, and grouse);
    - Provide habitat diversity, including habitats associated with standing snags, down wood, non-forested grasslands, shrub-lands, and deciduous woodlands and meet key habitat characteristics for goshawk, whitetail deer, western king bird, and big game.

Restore ponderosa pine ecosystems towards a more heterogeneous forested landscape with a diverse age and size structure (including old growth), understory structure and composition, patch size, and pattern that are resilient to natural disturbances (e.g. fire, insect/disease, climate change).

The project area encompasses 32,924 acres, of which about 12,137 acres are currently forested with ponderosa pine. The project area lies south of Highway 212 approximately 9 air miles east of Ashland, Montana. The southern half, currently has the largest extent of forest cover and where the majority of the proposed treatments would occur. The northern portion has experienced multiple large fires since 2000 and currently is in various stages of recovery. These fires have resulted in about 827 acres of non-forest conditions, that were previously forested and about 4,241 acres in a state of naturally reforesting. Proposed vegetation treatments are focused on the existing ponderosa pine forest cover, which this analysis will focus on (See the Proposed Treatment Prescriptions in Table 1 below). The ponderosa pine forested setting is the resource of concern and beetle hazard, vegetation composition, vegetation structure and planting are the issues pertaining to the purpose and need for restoring the pine ecosystems to a more heterogeneous landscape that are resilient to natural disturbances.

Existing forested vegetation is comprised of ponderosa pine with declining inclusions of green ash and other deciduous species found predominately in woody draws. In some cases, woody draws and grassland edges have become colonized by conifers, and in many areas the understory in ponderosa pine forest is dominated by ladder fuels. Ladder fuels being dense understory vegetation such as shrubs, brush, trees that act as ladders for wildfire to climb into the over-story canopies/crowns. Areas of forest vegetation that have not had recent management or disturbance have had continued tree growth and development, which has led to increased tree densities, promoted multi story stand structure and contiguous areas of high crown cover. About forty percent of the forested area in the project area has canopy cover exceeding 40%. Approximately 94% forested acres within the project area are greater than 10 inches in diameter. As such, existing forested stand conditions in the Threemile Project Area have been generally rated as moderate to high hazard for wildfire and bark beetle activity.

Fire and insects are the most common natural disturbances in the project area that have had or may have influence on the current condition of the forest vegetation. These disturbances are natural processes in forest vegetation landscapes, and they can be large or small and occur on an individual tree basis. Wildfire has been the most recent significant disturbance process (~18,574 acres) that resulted in large amounts of mortality (Yeager, 2018 (B). Active fire suppression and wildfire has largely shaped the current forest conditions. Past vegetation management documented since 1983 has influenced portions of the current forest vegetation (Yeager, 2018(A).

Historically, frequent low-intensity fires cleared dry type ponderosa pine forest types of brush and grass but left trees alive and healthy (Graham, et. al, USDA 2004). Extreme fires were uncommon. By excluding fire from the natural cycle through decades of fire suppression, extended drought and other changes, the result is greater tree densities and a buildup of flammable vegetation across large areas of the forest landscape resulting in large stand replacement fire.

Dry forests no longer appear or function as they once did. Changes in disturbance processes have resulted in large landscapes that are homogeneous in their compositions and structure, and these landscapes are set up for severe, large fire and insect disturbance events (Hessburg, Agee, Franklin, 2005).

In summary, the existing condition of Threemile Restoration and Resiliency Project area indicates an ecosystem that is not resilient to disturbance. Contiguous and even age timber stands are at risk for a large, stand replacing disturbance event across the project area. Such an event would make it difficult to provide the goods and services we desire from the Threemile Project Area.

Reduce fuel loads to enhance fire suppression capabilities by modifying fire behavior in the Threemile Restoration and Resiliency project area.

As stated in the October 2017 scoping letter, there are approximately 12,136 acres currently forested in the Project Area. Due to canopy covers often greater than 40 percent, and over 90 percent of the forested acres averaging trees greater than 10 inches in diameter, forested stands are rated as moderate to high hazard for wildfire.

The proposed changes in stand conditions and associated fuel treatments are needed to: 1) lessen the potential spatial extent and intensity of wildfire disturbances 2) reduce fuel loads to enhance wildland fire management/suppression capabilities by modifying fire behavior 3) address wildfire risk near Wildland Urban Interface (WUI) as described in the Powder River County CWPP; and 4) restore vegetative landscape conditions (both grassland, and forested lands) that would sustain low to moderate fire intensity within the Project Area.

Use the values at risk identified in the Powder River Wildfire Protection Plan (PRWPP, 2016) to help in the planning of vegetation management treatments on NFS lands.

Three primary factors were identified as presenting the greatest challenges and opportunities for making a positive difference in addressing wildland fire problems:

1. Restoring and maintaining resilient landscapes.

2. Creating fire-adapted communities.
3. Wildfire response

These factors were instrumental in the development of the *Powder River County Community Wildfire Protection Plan: A Collaborative Approach for Reducing Wildland Fire Risks 2016 Update*.

This plan was a collaborative effort involving the Forest Service, County Commissioners, Bureau of Land Management, Montana Department of Natural Resources and Conservation, and local fire officials. The Powder River County Commission approved the plan on August 8, 2016.

In that document, Wildland Urban Interface (WUI) is highlighted as an issue for when large fires leave the National Forest and impact private land and infrastructure. On pp. 49 and 53 of that plan, maps of the WUI depict the locations of private lands and structures in relation to the Project Area. There are over 25 miles of WUI boundary adjacent to the Project Area.

Provide wood products to contribute to employment and industry in local communities and help support the sustainable supply of timber from National Forest System lands.

The Forest Plan Objective for timber management is to provide an even flow of timber products to help support local industry, maintain a healthy diverse timber resource, improve of maintain wildlife habitat, salvage dead timber, control insects and disease, and reduce natural fuel loading (USDA 1986, p. 5).

Ashland Forest Products (Fox Companies) is a new start-up mill operating in the town of Ashland, Montana. This mill was constructed to initially harvest burnt timber in the region, processing it into products that will be used primarily as rough greenwood packaging material. The mill is built on a site leased from the Northern Cheyenne Tribe. As of August 2016, Ashland Forest Products employed 40 employees directly (90% from the Northern Cheyenne Tribe) and creates many other jobs for contractors and suppliers working for the mill independently. Ashland Forest Products hires independent logging contractors to harvest and deliver logs to the mill. Ashland has purchased salvage sales from the BIA, DNRC, private individuals and the Forest Service and intends to continue operating in the area shifting to utilizing green logs for its production.

Manage to maintain or improve long-term diversity and quality of habitat for Management Indicator Species (MIS) and selected species as identified in the Forest Plan (such as whitetail deer, mule deer, and grouse).

An important part of vegetative ecosystems on Ashland District is the woody draw component and the role the component plays in that system. These areas provide important habitat for many wildlife species, game and non-game (USDA 1986). There are about two acres of small woody draws inclusions containing deciduous trees (green ash and other deciduous species) in the project area. Vegetation condition is wide-ranging; in some cases, diverse age classes of deciduous trees and shrubs are growing with vigor, in others, species and age class diversity may be limited due to past management activity. Overall extent of deciduous woody vegetation has been reduced from its historic extent in portions of the project area, such as within the main Threemile drainage. In isolated situations, high conifer densities associated with fire suppression in the uplands may be affecting riparian and/or woody draw ecosystems. Shade intolerant

hardwood species such as green ash, chokecherry, buffaloberry, and plum are competing with shade tolerant conifers that have colonized draw bottoms. As an opportunity for enhancement of the woody draws when encountered during harvest operations these will have 90 percent of the ponderosa pine removed (see Table 1 Proposed Treatment Prescriptions – WD Woody Draw Treatment Activity).

ALTERNATIVES

The scoping proposed action was modified as a result of preliminary analysis and scoping input. Those changes are reflected in Alternative B, the Modified Proposed Action presented in this EA.

Overview of the Alternatives

Alternative A – Proposed Action, as scoped.

Alternative B – Modified Proposed Action.

Alternative C – No Action.

Details of the Alternatives

Tables 1, 2, 3, 4, and 5 show the proposed treatment prescriptions and activities that are common to the action alternatives.

Table 1. Proposed Treatment Prescriptions and Activities Common to All Action Alternatives. Also refer to Tables 2, 3, 4, and 5 below, and Maps 1, 2, and 3 of the Proposed Treatment Units by Alternative in Appendix A.

Treatment Code	***Treatment Prescription***
	Commercial Treatments
Commercial Harvest – *Use of mechanized equipment to cut and remove sawlog sized (≥ 9 inches dbh) trees for financial return to reduce stocking, improve forest health and meet the purpose and need. Tree dbh is outside bark diameter at breast height. Breast height is defined as 4.5 feet above the forest floor on the uphill side of the tree.* • *Improvement Treatment – A treatment that primarily reduces tree densities on dry aspects to improve composition and quality.* • ***Thinning Treatment*** *– Generally thinning from below (removal of smaller trees first) with the objective of reducing stand density primarily to improve growth, enhance forest health.* • ***Regeneration Treatment*** *- A type of treatment that removes all trees except those needed for the purposes of seed production. Prepares a seed bed and creates a new age class.* • ***Woody Draw Treatment*** *– A type of treatment within Commercial Harvest Units that removes 90% of the ponderosa pine in a woody draw community.*	
ICD (Dry)	***Commercial Improvement Cutting Activity (****These generally apply to dry aspects (S, SE, SW, and W)). Create open grown, predominately single story to two-story, variable spaced, healthy, productive ponderosa pine communities with limited ladder fuels and very low canopy coverage.* <u>*Treatment Details:*</u> ***Trees <u>></u> 9 inches dbh -*** *Thin from below to an average of 1 -10 trees per acre to create an irregular spacing of individual trees.* • *Average tree spacing is 66 to 209 feet. Variable spacing will occur based on existing stand conditions to create non uniform conditions.* • *Thinned areas would have canopy cover less than 40%.* • *Small inclusions of treatment CTM may occur.* • *Woody Draw Community Restoration –* o *Where woody draws occur within treatment units follow WD treatment description below.* ***Trees < 9 inches dbh -*** *Thinning from below in the < 9 inches dbh will occur to make treatment units more resilient to fire by reducing ladder fuels and promote recruitment of large trees.* • *Trees per acre will approximate 0 to 100 (minimum 20 foot spacing).*
CTM (Moist)	***Commercial Thinning Activity with Small Regeneration Openings (****These generally apply to moist aspects (N, NE, E, and NW)). Create open grown, predominately*

Table 1. Proposed Treatment Prescriptions and Activities Common to All Action Alternatives. Also refer to Tables 2, 3, 4, and 5 below, and Maps 1, 2, and 3 of the Proposed Treatment Units by Alternative in Appendix A.

Treatment Code	***Treatment Prescription***
	single to two story, variable spaced, healthy, productive ponderosa pine communities with limited ladder fuels and low to moderate canopy coverage with small openings. *Thinning Treatment Details:* ***Trees ≥ 9 inches dbh -*** *Thin from below to an average of 15 to 25 trees per acre to create an irregular spacing of individual trees.* • *Average tree spacing is 42 to 54 feet. Variable spacing will occur based on existing stand conditions to create non-uniform conditions.* • *Thinned areas would have canopy cover less than 40%.* • *Small inclusions of treatment ICD may occur.* • *Woody Draw Community Restoration –* o *Where woody draws occur within treatment units follow WD treatment description below.* ***Trees < 9 inches dbh -*** *Thinning from below in the < 9 inches dbh will occur to make treatment units more resilient to fire by reducing ladder fuels and promote recruitment of large trees.* • *Trees per acre will approximate 0 to 100 (minimum 20 foot spacing).* *Small Regeneration Openings Treatment Details:* *Create small openings ranging from ½ to 4 acres in size on 30 to 40% of the treatment unit. Depending on opening size, 6-10 individual trees per acre may be left to insure an adequate seed source for establishment of a new age class of trees.* *Site Preparation – Expose 10 to 20% bare mineral soil to prepare a seed bed for establishment of ponderosa pine seedlings.*
REGEN ST (Moist)	***Commercial Regeneration Treatment Activity (Seed Tree) –*** *Promote a new age class of ponderosa pine trees.* *Treatment Details:* *Create openings ranging up to 10 acres in size. Leave 6-10 individual trees per acre as needed to insure an adequate seed source for establishment of a new age class of trees.* *Site Preparation – Expose 10 to 20% bare mineral soil to prepare a seed bed for establishment of ponderosa pine seedlings.* • *Woody Draw Community Restoration –* o *Where woody draws occur within treatment units follow WD treatment description below.*
WD	***Woody Draw Treatment Activity*** *– Restoration of woody draws within commercial harvest units by removing the overtopping and competing ponderosa pine trees.*

Table 1. Proposed Treatment Prescriptions and Activities Common to All Action Alternatives. Also refer to Tables 2, 3, 4, and 5 below, and Maps 1, 2, and 3 of the Proposed Treatment Units by Alternative in Appendix A.

Treatment Code	***Treatment Prescription***
	Treatment Details: • *Fell 90% ponderosa pine trees within 1½ mature tree heights (approximately 110 feet) from the perimeter of the woody draw. Preference to retain large ponderosa pine trees with fire scars. Commercial sized trees (≥ 9" dbh), not identified for retention will be removed.* *Sub-merchantable material (< 9inches dbh) may be felled in a criss-cross manner to reduce cattle and wildlife trailing in the draw bottoms.*
	Non Commercial Treatments
PLT	***Artificial Regeneration –*** *Hand tree planting of ponderosa pine seedlings within past wildfire areas where a natural seed source is lacking to meet forest stocking objectives. Plant on approximately a 10 x 10 spacing (approximately 435 trees per acre) using appropriate seed sources.*
	Fuels Treatments
Fuels Treatment - *Treatment of natural and post activity fuels by mechanical, hand, or prescribed fire to decrease fuel loads.*	
RXB PP	***Broadcast Burning -*** *Prescribed burning activity where fire is applied to the majority or all of an area within well-defined boundaries for reduction of fuel hazard (natural fuels and/or activity fuels), or reduce tree densities, or to enhance the success of natural regeneration or all. The end result may include a mosaic of burned and unburned areas. Includes hand or mechanical fireline construction – a control line that is scraped or dug into mineral soil.*
RXB NF	***Broadcast Burning for Non-Forest Restoration Activity*** *- Prescribed burning activity where fire is applied to the majority or all of an area within well-defined boundaries for the enhancement and maintenance of hebaceous forage productivity and diversity for wildlife/livestock. The end result may include a mosaic of burned and unburned areas. Includes hand or mechanical fireline construction – a control line that is scraped or dug into mineral soil.*
PB	***Burning of Piled Material*** *- Burning of piled material including hand and machine piles. May be used in combination with other types of burning.*
HP	***Hand Pile*** *- Hand piling of fuels such as limbs, tops and boles of trees to reduce the overall tons per acre. The piles will be burned at a later date.*
MP	***Mechanical Pile -*** *Machine piling of fuels such as limbs, tops and boles of trees to reduce the overall tons per acre. Piles will be burned at a later date.*
WTY	***Whole Tree Yard*** *- Includes any activity that removes fuel from the treatment unit by carrying or dragging.*
LS	***Lop and Scatter -*** *Any rearranging of fuels such as limbs, tops, or brush to reduce fuel bed depth and speed up decomposition. Generally applied in low fuel loading situations.*

- There would be treatment of some woody draws that are coincident with a small number of commercial treatment units. In these woody draws all ponderosa pine within 1 to 1-1/2 tree height would be removed. This would allow green ash, box elder, willow and other shade intolerant deciduous species to regenerate and increase diversity across the landscape that are now being held back by the shade of ponderosa pine trees. The number of acres to be treated this way would be considered incidental to the commercially treated units and not broken out as a separate treatment activity.

- There are no harvest treatments proposed that would result in forest openings greater than 40 acres.

Travel Management

Common also to both Alternatives A and B would be the proposed revision of the current Ashland Ranger District Travel Management decision to decommission National Forest System Road (NFSR) 4703 from a point approximately 0.25 miles north of the junction of its junction with NFSR 4362 (T4S, R46E, SW25) north to the NFS land/private land boundary in T4S, R46E, NE24, 11th Guide Meridian. This route would be removed as a route designated for public motorized use. Decommissioning would occur after implementation of the Threemile Restoration and Resiliency Project. Decommissioning would include removal of culverts and ensuring functional erosion prevention and control measures are implemented.

Weed Treatments

Existing weed infestations would be contained to their current locations under the current Ashland Ranger District weed treatment program (Rangeland Management/Noxious Weeds Report, p. 18), which is conducted pursuant to the Custer National Forest Noxious Weed Management ROD and attendant FEIS (USDA-Forest Service. 2006. Custer National Forest). Continued weed monitoring and treatment over time have kept the weed infestations to a low amount at the present time. Noxious weeds are being treated with herbicide and will continue to be managed. Monitoring for weeds on disturbed sites will continue. (Rangeland Management/ Noxious Weeds Report, p. 18).

The Ashland Ranger District has had an active weed control program for at least the past 30 years. The District has mapped all known weeds and assigns a treatment schedule and management strategy to help ensure a long term and consistent treatment program. Each treatment site is monitored to review the effectiveness of treatment, measured in terms of percent and documented in FACTs database. (Rangeland Management/Noxious Weeds Report, p. 19). There is no decision to be made for the Threemile Restoration and Resiliency Project regarding noxious weed treatments. Alternative A - Proposed Action, as Scoped

The proposed action, as scoped, was developed to address the purpose and needs for action as described above. It served as a starting point for the Forest Service, the public, and other agencies on which to focus their comments. The proposed action, as scoped, is being carried forward as Alternative A, and analyzed in the Environmental Effects section of this document. Map 2 displays all the proposed commercial and non-commercial treatment units with and without prescribed burning, and artificial regeneration (Appendix A).

The proposed action, as scoped, included 3,012 acres of commercial mechanical treatments (Ponderosa Pine), of which 1,180 acres would be broadcast burn and 1,833 acres would not be broadcast burn, there would be 253 acres of planting, 2,820 acres of non-commercial broadcast burning of Ponderosa Pine, and 1,971 acres of broadcast burning of non-forest. Woody draw treatment activity was proposed but the number of acres to be treated would not be known until after some field reconnaissance was completed. It would take construction of about 25 miles of temporary roads to access proposed units. (Transportation Specialist Report, pp. 6-7). Temporary roads would be closed to public use pursuant to the Timber Sale Contract clause C5.41# - Closure to Use by Others (3/07), and upon completion of log haul, these temporary would be decommissioned. Also proposed was a revision of the Ashland Ranger District Travel Management decision to decommission NFSR 4703 from the junction of 4362 (T4S, R46E, Sw25) north to the NFS land/private land boundary in T4S, R46E, NE24, 11th Guide Meridian. (Transportation Specialist Report, pp. 7-8).

Within the portion of the proposed areas for treatments, 4,759 acres are forested and 3,297 acres are non-forested landscapes. Treatment is not proposed on 6,559 of the forested acres within the project area. That means there are 16,197 acres within the project are on which treatments are not proposed.

The project area has approximately 67 miles of motorized routes within the project area, which includes approximately 33.9 miles of Forest Service jurisdiction roads and approximately 20.7 miles of motorized trails. In addition, there is approximately 6.2 miles of private roads and 4.5 miles of county roads. The existing transportation system was developed to meet management needs. Existing Forest Service jurisdiction *National Forest System Roads* (NFSRs) within the project area would be used as access for the project. A National Forest System road is a forest road that is wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System (NFS) lands and the use and development of its resources, and that does not have a legally documented right of way held by a state, county, or other local public road authority. (36 CFR part 212). Routes 4410, 40925, 4778 and 47781 are motorized trails that would be converted to maintenance level 2 roads during the project and would be converted back to motorized trails open to all highway legal vehicles at the end of the project. (Transportation Specialist Report, pp. 4-5).

We stated in the scoping document that we thought it would take construction of approximately 25 miles of temporary roads to access proposed treatment units. However, upon closer review of the access needed to proposed treatment units in Alternative A, we determined it would take about 28.3 miles of temporary roads to provide the necessary access. Temporary roads would closed to public use, and upon completion of log haul, these temporary roads would be decommissioned.

The project area includes a portion of motorized trail 4703 that is approximately 2.1 miles long and is proposed for decommissioning. Route 4410, 40925, 4778 and 47781 are motorized trails that would be converted to maintenance level 2 roads during the project and would be converted back to motorized trails open to all highway legal vehicles at the end of the project. (Transportation Specialist Report, pp. 4-5).

Road 4362 is the only surfaced maintenance level 3 road in the project. (Transportation Specialist Report, p. 2).

The majority of the administrative use roads align with access to structural range improvement, such as, pipelines and spring developments. Reconstruction activities along these roads may include work to the range pipelines. (Transportation Specialist Report, p. 2).

Best Management Practices (BMPs) that are needed on most roads include proper drainage structures including road maintenance, ditch maintenance, rolling dips, grade sags, water bars, proper stream crossings, culvert cleaning, and spot surfacing. Additional work including realignment and reconstruction would be needed on most of the administrative use roads. (Transportation Specialist Report, p. 2).

Table 2. Alternative A – Proposed Action Proposed Acres of Commercial Treatments.

Prescription	Code	Fuels Treatment	Code	Acres
Commercial Improvement Cutting Activity (Dry) - Broadcast Burning: Ponderosa Pine	ICD	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	461
Commercial Improvement Cutting Activity (Dry) - No Broadcast Burning: Ponderosa Pine	ICD	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	601
Commercial Thinning Activity with Small Regeneration Openings (Moist) and Broadcast Burning: Ponderosa Pine	CTM	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	Thin 366-247 Small Openings 183-244 Average 610
Commercial Thinning Activity with Small Regeneration Openings (Moist) and No Broadcast Burning: Ponderosa Pine	CTM	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	Thin 625-729 Small Openings 312-416 Average 1041
Commercial Regeneration Treatment Activity (Moist) and Broadcast Burning: Ponderosa Pine	REGEN ST	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	109
Commercial Regeneration Treatment Activity (Moist) and No Broadcast Burning: Ponderosa Pine	REGEN ST	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	191
Commercial Treatment Activity (Ponderosa Pine) with Broadcast Burning			**Subtotal**	**1180**
Commercial Treatment Activity (Ponderosa Pine) without Broadcast Burning			**Subtotal**	**1833**
Total Commercial Treatment Acres				**3012**

Table 3: Alternative A – Proposed Action Proposed Acres of Non-Commercial Treatments and No Treatment.

Prescription	Code	Fuels Treatment	Code	Alternative A (Acres)
Artificial Regeneration	PLT	To Be Determined		253
		Artificial Regeneration	**Subtotal**	**253**
Broadcast Burning Ponderosa Pine		Broadcast Burning Ponderosa Pine	RXB PP	2820
Broadcast Burning Non-forest		Broadcast Burning Non-forest	RXB NF	1971
		Broadcast Burning	**Subtotal**	**4791**
			Total Non-Commercial Treatment Acres	**5044**

The current road system would require reconstruction along most routes, and certain road segments would require realignment in order to accomplish project work. There are many sections of road that are too steep and will require the road to be realigned in order to meet log haul requirements. Transportation Specialist Report, p. 5.

Many of the ML2 Open for Administrative Use roads have pipelines that follow, more or less, the road corridor. Reconstruction and realignment of these routes may require either realigning the road or realigning the pipeline. Transportation Specialist Report, p. 5.

There are approximately 14.4 road and 9.9 trail miles (24.2 total miles Alternative A). There are approximately 20.7 miles of motorized trails within the project boundary. Approximately 7.9 miles would be converted to ML 2 roads during the project and then converted back to motorized trails once project work is complete. Transportation Specialist Report, p. 6.

Alternative B –Proposed Action - Modified

The activities that are proposed as a part of the Modified Proposed Action are described briefly in the bullet points below, and in Table 4 – Proposed Action – Modified, Proposed Acres of Commercial Treatments; and, Table 5 – Proposed Acres of Non-Commercial Treatments and No Treatment. Map 3 displays all the proposed commercial and non-commercial treatment units with and without prescribed burning, and artificial regeneration (Appendix A).

- Commercial treatment the mid-aged and mature ponderosa pine forested areas to create clumps and openings or gaps (new age class) across the landscape through our timber unit prescriptions.
- To help in creating a patch mosaic of openings across the landscape and be efficient in the implementation of the proposal, commercial treatment units less than or equal to 10 acres in size throughout the project area will be regeneration harvested.
- Creation of this vegetation mosaic where more there are more surface fires, rather than torching or crown fires that readily kill large Ponderosa pine (Fire & Fuel Management Report, p. 13)

- There will be treatment of some woody draws that are coincident with a small number of commercial treatment units. In these woody draws all ponderosa pine within 1 to 1-1/2 tree height would be removed. This would allow green ash, box elder, willow and other shade intolerant deciduous species to regenerate and increase diversity across the landscape that are now being held back by the shade of ponderosa pine trees. The number of acres to be treated this way would be considered incidental to the commercially treated units and not broken out as a separate treatment activity.

Table 4. Alternative B –Proposed Action – Modified, Proposed Acres of Commercial Treatments.

Prescription	Code	Fuels Treatment	Code	Acres
Commercial Improvement Cutting Activity (Dry) - Broadcast Burning: Ponderosa Pine	ICD	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	385
Commercial Improvement Cutting Activity (Dry) - No Broadcast Burning: Ponderosa Pine	ICD	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	761
Commercial Thinning Activity with Small Regeneration Openings (Moist) and Broadcast Burning: Ponderosa Pine	CTM	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	622
Commercial Thinning Activity with Small Regeneration Openings (Moist) and No Broadcast Burning: Ponderosa Pine	CTM	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	883
Commercial Regeneration Treatment Activity (Moist) and Broadcast Burning: Ponderosa Pine	REGEN ST	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	243
Commercial Regeneration Treatment Activity (Moist) and No Broadcast Burning: Ponderosa Pine	REGEN ST	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	266
Commercial Treatment Activity (Ponderosa Pine) with Broadcast Burning			**Subtotal**	**1250**
Commercial Treatment Activity (Ponderosa Pine) without Broadcast Burning			**Subtotal**	**1910**
Total Commercial Treatment Acres				**3160**

Table 5: Alternative B – Modified Proposed Action Proposed Acres of Non-Commercial Treatments and No Treatment.

Prescription	Code	Fuels Treatment	Code	Acres
Artificial Regeneration	PLT	To Be Determined		253
		Artificial Regeneration	**Subtotal**	**253**
Broadcast Burning Ponderosa Pine		Broadcast Burning Ponderosa Pine	RXB PP	2497
Broadcast Burning Non-forest		Broadcast Burning Non-forest	RXB NF	1508
		Broadcast Burning	**Subtotal**	**4005**
			Total Non-Commercial Treatment Acres	**4258**

The current road system would require reconstruction along most routes, and certain road segments would require realignment in order to accomplish project work. There are many sections of road that are too steep and will require the road to be realigned in order to meet log haul requirements. (Transportation Report, p. 5).

Many of the ML2 Open for Administrative use roads have pipelines that follow, more or less, the road corridor. Reconstruction and realignment of these routes may require either realigning the road or realigning the pipeline. (Transportation Report, p. 5).

There would be about 13.8 road and 9.9 trail miles (23.7 total miles) in Alternative B of road maintenance to be conducted (Transportation Report, p. 6).

There are numerous motorized trails within the project area. There are approximately 18.7 miles of motorized trails within the project boundary. Approximately 9.9 miles would be converted to ML 2 roads during the project and then converted back to motorized trails once project work is complete. (Transportation Report, p. 6).

There would be approximately 26.0 miles of temporary roads constructed to access proposed treatment units. Temporary roads would be closed to public use, and upon completion of log haul, these temporary roads would be decommissioned (Transportation Report, pp. 5-7; TSC clause #C5.41# - Closure To Use By Others (3/07).

Alternative C – No Action

No actions would be initiated for treatments of vegetation and fuels on National Forest System lands in the analysis area. This alternative would continue the standard resource protection and recurrent maintenance activities such as access management and routine scheduled road maintenance that are currently on-going in the project area. Ecosystem processes such as vegetation succession would continue their current trends. This alternative proposes no actions that are contained in Alternatives A and B.

The National Environmental Policy Act (NEPA) directs the agency to use the scoping process for an early identification of what are and what are not the real issues (40 CFR Sec. 1501.7). Scoping comments were reviewed to identify concerns and issues relative to the Proposed

Action. Comments from scoping and the 30 day notice and comment period will be summarized in a content analysis of public comment that will be located within the Project Record. Issues raised by the public were addressed: 1) by developing alternatives to the Proposed Action; 2) in project design; 3) by creating resource protection measures; and 4) through analysis to determine environmental effects. Specialists have identified the resource issues they will address in their respective analyses.

A total of three letters were received from individuals and organizations in response to the scoping package. One commenter in particular identified a number of issues regarding the effects to wildlife and wildlife habitat of the proposed action. These issues have been addressed in the Wildlife section in the Environmental Consequences section, below.

No significant issues have been identified. Broadcast burning was dropped to lessen the amount of change in forested cover for wildlife concerns (see wildlife report) and helped shape the Alternative B treatment scenario, notably in Sections 17, 18, 19, and 20.

Design Criteria Common to the Action Alternatives.

1. Forest Management

a. Silvicultural Prescription: Preparation and approval of detailed silvicultural prescriptions for all treatment units. *Applicable to all treatment units in forested stands.*

b. Treatment Deviations: treatment deviations as a result of changed or unidentified conditions that materially affect the intended treatment as described in the detailed site specific silvicultural prescription will be consulted with by the Project Silviculturist. As needed, the silvicultural prescription will be modified and re-approved by a certified silviculturist. *Applicable to all treatment units.*

c. Leave Tree Protection:

1) During implementation, contractor will take all reasonable care to avoid damage to the roots, bole, and crown of live trees that will be reserved from cutting. When any live tree is damaged beyond recovery (expected to die within 1 year) that was intended to be retained, it can be removed or otherwise treated by the contractor as instructed by the Forest Service. *Applicable to all treatment units.*

2) No old growth stands were found during field inventory (Sandbak, 2018C). However, small microsites (< 1 acre and generally less than 1/2 acre in size) were detected that met minimum attributes of old growth for age, diameter, and basal area (Greene et. al., 1992). One area was found in each of the following units: 8, 15, 25, 104, 175, and 180. Units 15 and 175 have no proposed treatment in Alternative A and Unit 175 has no treatment in Alternative B. Units 8, 25, and 104 have commercial harvest proposed with no prescribed burning, Unit 180 has commercial harvest and prescribed burning under Alternative A. Under alternative B, units 8, 15, 25, and 104 have commercial harvest proposed with no prescribed burning, Unit 180 has commercial harvest and prescribed burning. Within these small areas in these units, trees $\geq$ to 17" dbh and $\geq$ 180 years old will be marked as leave trees to maintain the minimum old growth attributes. During implementation, the Silviculturist will be notified if any additional areas are detected. These areas will be assessed and prescriptions modified to ensure old growth attributes are maintained.

Applicable to Units 8, 25, 104, and 180 in Alternative A and Units 8, 15, 25, 104, 175, and 180 under Alternative B.

3) Individual large trees ≥ 17 inches and ≥ 180 years are widely scattered throughout the project area. These typically have flat-tops, small live crowns, thinning crowns, thick fissured orange colored bark, stem rot, with many having old fire scars on base of the tree bole. When encountered in the proposed commercial treatment units, these individual trees (if not a safety hazard) will be marked as leave trees and retained and serve as replacement snags. Prior to burning fuel accumulation (woody debris and duff) will be pulled back as needed from these individual trees. *Applicable to all commercial treatment units with and without RXB PP.*

4) Where available, while maintaining the average leave trees per acre, leave 1 to 3 clumps per acre of 2 to 4+ TPA with interlocking crowns in the ICD units and thinning areas within the CTM units. *Applicable to ICD and thinning areas of the CTM areas, not applicable to small openings on CTM units and REGEN ST units.*

- **Trees > 9 inches dbh** - Maintain clumps of trees with interlocking crowns by leaving 1 to 3 clumps per acre of 2 to 4+ trees.
  - Maximum distance of tree stems within clumps should be about 20 feet to ensure interlocking crowns.
  - Spacing between clumps will vary and will be based on where natural clumping of trees occurs. Where possible clumping will be scattered across the treatment area.
  - Tree clumps would generally have greater than 40% canopy cover.
  - Tree clumps would average 1-8% of treated area and worked into the average leave trees per acre.
  - Preference for clump placement should be around existing snags.
- **Post-Sale Thinning Activities Trees 5 to 9 inches dbh** – Promote clumps of trees with interlocking crowns by leaving 1 to 3 clumps per acre of 2 to 4+ trees.
  - Maximum distance of tree stems within clumps based on existing crown diameters and/or ability to expand to interlocking crown.
  - Spacing between clumps will vary and will be based on where natural clumping of trees occurs. Where possible clumping will be scattered across the treatment area.
  - Tree clumps would average 1-8% of treated area and worked into the average leave trees per acre.
  - Preference for clump placement should be around existing snags.

5) Areas > 1 to 2 acres in size within the ICD units with moist aspects will have trees marked according to the CTM average spacing (15 to 25 trees). Dry areas > 1 to 2 acres in size within the CTM units will have leave trees marked according to the ICD average spacing (1 to 10 trees). This will promote density diversity within the CTM and ICD treatment areas.

d. Landing Piles: Where possible landing piles should not occur near live green trees. Landing piles will be burned, and the sites rehabilitated. *Applicable to all commercial treatment units that will have landings.*

e. Windthrow: Avoid layout of cutting unit boundaries with wind catching indentations, long straight lines or square corners. Long straight lines and square corners deflect wind and increase windthrow. Create irregular cutting boundaries without sharp indentations or square corners to lessen the opportunity for deflection and funneling of air currents. *Applicable to all commercial treatment units.*

f. Pine Engraver Infestation Susceptibility: Reduce pine engraver infestation susceptibility. For proposed commercial and non-commercial thinning activities, when treating 3 inches and larger activity slash on site, lop into small pieces to expose to sunlight to dry it out or do not create slash from January through July making it less suitable for beetle colonization. Landing piles should be a minimum of 20 feet wide and 10 feet deep to attract emerging beetles deeper into piles. Minimize logging damage to leave trees and avoid scorching leave trees when burning activity fuel piles to prevent population buildup and subsequent tree killing. *Applicable to all commercial treatment units.*

g. Natural Regeneration: Prepare seedbed for the establishment of natural regeneration on treatment sites intended for conifer reestablishment. Expose 10-15% bare mineral soil scattered across the treatment area, accomplished by mechanical harvest treatment activity or broadcast burning. Ensure every treatment unit receiving a regeneration harvest will meet or surpass stocking guidelines and certification standards within 5 years (USDA, 2006 and Table 6). Large openings ($\geq$ 2 acres) created by prescribed burning will be monitored to ensure restocking. Monitoring will occur the 1st, 3rd, and 5th year after harvest/treatment. Areas not progressing to certification by year 3 will be reevaluated for further treatment needs. To protect seed trees, fuel accumulation (woody debris and duff) will be pulled back as needed from designated seed trees prior to prescribed burning in all units with a regeneration treatments. *Applicable to the small openings in the CTM units, REGEN ST units, and RXB PP units.*

Table 6: Minimum Trees per Acre and % Stocked Area by Suitability for Certification of Regeneration.

Habitat Type[1]	Aspect	TPA	% Stocked Area[2]	Suitability
110, 130, 191	All	15 - 25	15 - 25	Unsuitable
140, 141, 192	SW, W, S, SE	15 - 25	15 - 25	Unsuitable
140, 141, 192	NW, N, N, NE, E	50 - 100	25 - 50	Unsuitable
170, 171, 172, 180, 181, 182 193, 194, 195	SW, W, S, SE	50 - 100	25 - 50	Unsuitable
170, 171, 172, 180, 181, 182 193, 194, 195	NW, N, N, NE, E	100 - 200	80% +	Suitable

[1] Pfister et.al. 1977 and Hansen, Hoffman. 1988.

[2]Percent capable growing area stocked to the minimum TPA for certification listed to the left.

h. Artificial Regeneration: Use of ponderosa pine seed approved by the Forest Silviculturist to ensure adaptability to sites within the project area. Regional seed transfer guidelines will be adhered to. Monitoring as a minimum the 1st and 3rd growing season to ensure stocking

objectives are met (Table 6). Areas not meeting certification standards by year 3 will be reevaluated for additional treatment needs. *Applicable to PLT treatment units.*

i. Prescribed Burning Over story Mortality: Table 7 shows the Management Strategy to Achieve Prescribed Fire Goals. *Applicable to all treatment units with broadcast burning.*

Table 7: Management Strategy for Prescribed Fire

			Management Strategy to Achieve Prescribed fire Goals		
Treatment	**Code**	**Approximate Ratio of Ground Area Burned: Unburned**	**Percent of Area in Fires Created Canopy Openings**	**Average Fire Created Canopy Opening Size in Acres**	**Percent Fire Created Overstory[1] Tree Mortality**
Commercial Improvement Cutting Activity (Dry) and Broadcast Burning	ICD	90:10	≤ 3	.5	≤ 10
Commercial Thinning Activity with Small Regeneration Openings (Moist) and Broadcast Burning	CTM	70:30	≤ 3	.5	≤ 10
Commercial Regeneration Treatment Activity and Broadcast Burning	REGEN ST	90:10	≤ 3	.5	≤ 10
Broadcast Burning in Ponderosa Pine	RXB PP	70:30	≤ 5	1	≤ 20

[1]Trees larger ≥ 9" dbh.

(Forest Vegetation Report, pp. 24-27, project record).

2. Fire and Fuels

a. Prescribed fire would take place under conditions much less than typical summer season wildfires. An example is 1000 hour fuels would most likely be above 15 percent moisture, temperatures would be below 80 degrees, relative humidity would be above 25 percent, and winds would be below 15 miles per hour.

b. Prescribed fire control lines would be placed so they do not contribute to sediment to streams or affect wetlands or natural springs. Firelines would be rehabilitated to prevent erosion and the establishment of noxious weeds.

c. Burning would follow all applicable air quality regulations.

d. Public notification would occur in areas that may be adversely affected by smoke concentrations prior to and during burning implementation.

e. In most cases, burning won't be done when winds are from the east due to Northern Cheyenne Indian Reservation air-shed concerns.

f. Pile burning would occur with roughly 2 inches of snow on site, and should be expected to remain for 48 hours after ignition.

g. No heavy fuels will be piled and burned on or adjacent to known heritage sites.

h. Piling and burning activity slash, or prescribed burning, would avoid known weed infestations unless it coincides with other weed treatment.

i. Prescribed burning activities will be coordinated with range management specialists and grazing allotment permittees.

(Fire & Fuel Management Report, pp. 59-60, project record).

3. Wildlife

a. Northern Long-Eared Bats and sensitive bats:

1) There will be no tree removal within 0.25 miles of a known, occupied winter hibernacula year round. Currently, no known hibernacula are within in Threemile Project area however this mitigation measure will be applied if such a site is found.

2) Avoid cutting or destroying known, occupied roost trees during the pup season (June 1 – July 31) or any trees within 150 feet of a known, occupied roost tree. There are no known roost trees within in Threemile project area however this mitigation measure will be applied if such a site is found.

3) If a bat or bats (any species) are seen clinging to, crawling on, or flying from, a tree identified for harvest, the tree will be left standing until either a) no bats are seen on or near the tree, or b) after the pup season (after July 31). *This measure should be effective because: a) any bat species would be protected; i.e. loggers would not be required to identify bat species, b) northern long-eared bats switch tree roosts often – typically every 2 to 3 days (USDI 2015) and c) young bats should have sufficient flight skills developed by the end of pup season to escape harm*.

4) Leave all existing snags, greater than or equal to 4.5" diameter, which do not pose a safety hazard during project implementation.

(Wildlife Report, p. 22, project record).

b. Northern Goshawk

1) A minimum of 40 acres will be maintained as yearlong a no activity buffer around known goshawk nests as designated by the wildlife biologist.

2) No ground disturbing activities will occur within the Post Fledgling Area (420 acres around occupied nests) from April 15 to August 15.

3) Both 40 acre nesting buffers and 420 acre Post Fledgling area buffers will be applied if an active goshawk nest is discovered prior to or during treatment as specified by the wildlife biologist.

(Wildlife Report, pp. 22-27, project record).

c. Big Game

1) Manage for at least 30% security cover that incudes forested and non-forested habitat.

2) Provide for security by creating security areas which are more than 0.5 miles from a road open to motor vehicle use and at least 250 acres in size.

3) Viable hiding cover within 75 feet of open roads or large openings will be retained where feasible. During implementation the wildlife biologist should be consulted to help with the understanding of this design criteria.

a) That vegetation and/or topography that provides visual and sound buffers. Open roads are those designated for open motorized use in the Ashland Travel decision.

4) At the suggestion of Montana Fish, Wildlife and Parks wildlife biologist, we've added a design criteria/mitigation to avoid areas that contain shrubs, notably sagebrush (Artemisia spp.) during prescribed burning, when possible.

(Wildlife Report, pp. 28-33, project record).

d. Other Wildlife

1) If an active raptor nest is known or located within the treatment unit it will be protected and buffered from planned activities to protect and maintain raptor use. Species specific recommendations will be followed regarding permanent buffers and ground disturbing activity timing restrictions as laid out in the Custer National Forest Management Plan (below). Buffers for raptor species not specified in the Forest Plan will be determined by the wildlife biologist.

a) During the nesting seasons for prairie falcon (15 March – 20 July) and Merlin (15 March – 15 July) a ¼ mile buffer excluding timber harvesting activities will need to be maintained.

b) Golden eagle nests will also require a ¼ mile buffer during the inactive nest period (15 February – 1 May). In the event that golden eagles begin actively nesting (adults defending the nest, eggs, or young present) a ½ mile buffer will be necessary from that moment until 15 July, to be compliant with the Forest Plan (USDA 1986, p. 19).

c) Known nest trees for eagles, falcons, and Merlins should not be harvested.

2) Where available maintain at least two snags per acre 10 inches DBH or larger (preference is for largest available). Also provide for snag replacement trees according to the Northern Region Snag Management Protocol. In the absence of current standing snag trees, wildlife character trees will be maintained. Character trees are defined as forked, lateral branched, crooked or otherwise having a unique growth pattern. When possible both snags and character trees will be maintained within green tree patches or clumps.

3) If sharp-tail grouse leks are known or discovered along temporary roadways, all activities within ¼ mile of the active lek will not occur from March 1 to April 15. New road construction will not occur within 200 feet of a known lek. *Note: there are no known leks near planned temporary roads.*

4) Design temporary roads to avoid prairie dog towns such that no activity would occur within 100 feet of the town. There are two black-tailed prairie dog towns where this applies.

(Wildlife Report, pp. 34-37, project record).

4. Water

a. Temporary stream/draw crossings:

1) Number of temporary stream/draw crossings would be minimized to the extent possible. All temporary stream/draw crossings would be constructed to minimize sediment delivery to stream channels, convey high flows, and maintain passage of aquatic organisms.

2) All temporary crossings would be rehabilitated immediately upon project completion. Crossing rehab would include reconstructing crossings to match upstream and downstream streambed/draw bottom material and channel dimensions. Disturbed areas would be rehabilitated by applying any stockpiled topsoil and forest duff as well as a Forest-approved seed mix.

b. Standard timber sale protection provisions would be applied to the commercial harvest activities to protect against soil erosion and sedimentation. Timber harvest activities will be conducted in compliance with Water Quality BMPs for Montana Forests (Logan 2001).

c. All operations adjacent to perennial, intermittent, and/or ephemeral streams will be in compliance with the Montana Streamside Management Zone (SMZ) law (MCA 77-5-301 through 307. An Alternative Practices waiver would be acquired from Montana DNRC where proposed treatments deviate from SMZ rules pertaining to tree retention and broadcast burning.

d. Vehicles and logging machinery would not be driven within 50 feet of wetlands or springs, with the exception of maintenance/reconstruction/decommissioning of existing roads and designated temporary crossings.

e. All required water quality permits, including but not limited to 124 (Stream Protection Act), 318 (Short Term Water Quality Standard for Turbidity), 310 (Montana Natural Streambed and Land Preservation Act), and Nationwide 404 (Federal Clean Water Act) permits would be acquired by the Custer Gallatin NF prior to any ground disturbance.

f. Watercourses that do not meet the criteria for a Class 3 Streams under Montana SMZ Rules- i.e. draws with no defined channel and upland vegetation extending to the draw bottom but nonetheless have potential to convey water during high intensity precipitation events (hereafter referred to as “draw bottoms”)- would be subject to added protections during implementation of the Threemile project.

1) Temporary roads, log landings, primary skid trails, and firelines would not be located directly in draw bottoms unless no practical alternative exists. In the event that no alternative exists, efforts would be made to minimize disturbed soil extent in the draw bottom.

2) Further site-specific mitigations may be required where these features fall in drainages exceeding two tenths of a square mile in area. Substantial runoff response under high intensity precipitation is most likely above this drainage area threshold.

3) Where temporary roads, log landings, skid trails, or firelines are required near, but not directly in, draw bottoms, they would be positioned just above draw bottoms on toe slopes or the lower third of adjacent slopes. The purpose of this criteria is to 1) avoid erosion and sedimentation resulting from roads, trails, and firelines falling

higher on hillslopes and 2) minimize the potential for flood inundation during high flow events.

4) Temporary roads, log landings, primary skid trails, and fire-lines would be located/constructed so as to avoid disrupting deciduous woody channel/draw-associated vegetation to the extent possible.

5) Project proponents would coordinate with CGNF hydrology and soils personnel prior to construction of temporary roads, log landings, skid trails, or fire-lines in or near draw bottoms to ensure that soil and water resource impairment risk would be avoided or mitigated.

g. Temporary roads and primary skid trails would be rehabilitated upon project conclusion. Rehabilitation would be accomplished through a combination of site appropriate techniques including, but not limited to, ripping, re-contouring, and/or slashing upon completion of harvest activities.

h. Riparian and wetland vegetation would not be directly lit during prescribed burning operations.

i. If feasible, Unit 914 would be burned in multiple smaller units to minimize the potential for sediment delivery to the North Fork of Threemile Creek.

(Threemile Water Resources Specialist Report, pp. 17-18, project record).

5. Soils

a. To ensure future soil productivity, retain3-5 tons per acre of down woody debris greater than three inches in diameter (where available) in treatment units.

b. Hand and mechanical operations must be in compliance with USFS R1 soil quality guidelines (R1 Supplement No. 2500-99-1). This guideline requires that management activities should not create detrimental soil conditions on greater than 15 percent of the activity area. Any detrimental disturbance exceeding 15% in the activity area would be remediated after treatment. Detrimental soil disturbance includes any or all of the following (from FSM 2500 R1 Supplement 2500-99-1 2554.10):

1) Compaction resulting in a 15 percent increase in bulk density
2) Rutting in excess of 2 inches
3) Displacement of soil of one or more inches depth from a surface soil horizon from a continuous area greater than 100 square feet
4) Physical and biological changes to soil resulting from high severity burning
5) Severe surface erosion, evidenced by rills, gullying, and soil deposition

(Soils Report, pp. 10-12, project record).

c. *Commercial mechanical treatments:*

1) Log landings would be located on relatively flat ground that can be drained.
2) Design criteria for operable gradients in ground-based harvest and mastication systems:
   a) Ground-based harvest and mastication systems would only be used on slopes having sustained grades less than 35 percent. A systematic skid trail pattern would be required during logging. Skid trails would be laid out in a manner that minimizes or

eliminates sustained grades steeper than 15%. An average of at least 75 feet would be maintained between skid trails in harvest units, except where skid trails converge.

3) Ground based skidding equipment would travel off established skid trails only to the extent reasonably necessary to harvest available timber.

4) Where possible, equipment would drive on slash to minimize soil disturbance.

5) Areas of concentrated soil disturbance such as landings, skid trails, and soils under slash piles would be ripped/scarified where compaction exists and seeded with native species after harvest activities are complete. Erosion control and drainage measures will be applied as appropriate immediately following completion of unit harvest and mastication activities.

6) Vehicles and logging machinery would not be driven within 50 feet of wetlands, with the exception of maintenance/reconstruction/decommissioning of existing roads and designated temporary crossings.

7) Standard timber sale protection provisions would be applied to the commercial harvest and mechanical mastication activities to protect against soil erosion and sedimentation. Timber harvest activities and mastication activities would be conducted in compliance with Water Quality BMPs for Montana Forests (Logan 2001).

8) To allow for recovery of organic matter on site, minimize erosion potential, and ensure maintenance of long-term soil productivity, and subject to the bounds of applicable grazing permits and associated administration, cattle grazing should be deferred, following mechanical harvest and mastication activities.

(Soils Report, pp. 10-12, project record).

d. Prescribed burning:

1) When briefing prescribed burn crewmembers, use of Minimum Impact Suppression Tactics (MIST) for any burn-related suppression activities would be emphasized.

2) Should unforeseen soil displacement or compaction occur as a result of project implementation from activities such as digging or blading of fireline or cross-country fire engine travel along a previously nonexistent route (such as in the event of "slopover" or spotting), restoration activities would be undertaken to facilitate site recovery. These activities may include, but would not be limited to, ripping and/or seeding using native seed mix.

3) To allow for recovery of organic matter on site, minimize erosion potential, and ensure maintenance of long-term soil productivity, cattle grazing should be deferred post-burn.

4) Where prescribed burning would coincide with units proposed for commercial timber harvest, prescribed burning would not occur any sooner than three years after commercial harvest. After three years, site conditions would be reviewed by fuels and watershed/soils personnel to assess the probability of negative soil and water resource impacts stemming from implementation of commercial harvest and prescribed burning in close succession across the entirety of these two drainages. This site review may include, but not be limited to: evaluation of persisting detrimental soil disturbance following harvest; percent ground cover and evaluation of on-site organic matter; and monitoring of downed coarse wood concentration. If a longer recovery period is deemed necessary, prescribed burning would delayed and future timing revaluated to ensure the five year stocking requirements are met according to the NFMA.

5) For broadcast burn units not coinciding with commercial timber harvest, an interdisciplinary pre-implementation review would be conducted to confirm site readiness. This site review may include, but not be limited to: evaluation of persisting detrimental soil disturbance following harvest; percent ground cover and evaluation of on-site organic matter; and monitoring of downed coarse wood concentration. If a longer recovery period following past management or natural disturbance is deemed necessary, prescribed burning would delayed until a later time.

(Soils Report, pp. 10-12, project record).

e. Pile Burning:

1. 1) Where feasible and practicable, crews may consider building crib structures to elevate burn piles six to twelve inches off the ground to minimize degree of soil burn severity. (Suggestion: Don't burn to completion to limit sustained high heating from smoldering logs)

(Soils Report, pp. 10-12, project record).

6. Range and Noxious Weeds

a. Stockwater Improvements

1) Increased vehicle and equipment use due to logging, thinning and burning, in pipeline corridors will need to be closely monitored for damage. Surfacing may be required to reduce impact where known lines are in roadways. During the grazing season, pipeline damage will need to be repaired immediately as to not inhibit the permitted livestock well-being and grazing distribution.

2) Accurate and detailed maps of range management structures would be provided to the Sale Administrator and/or contractor, and prescribed burn organizations, showing the location of the structures. However, some of the lines are almost 30 years old and mapping accuracy cannot be guaranteed for an underground structure. Structures could also be flagged in the project area for identification. It is foreseeable that since the structures have already been established by the Forest Service and associated permittees, any damage to structures would be assigned to the timber purchaser and any other service contracts. Repair or repair costs to standard would be expected of the contractor, as well as to the Forest Service, during burn operations or other treatments.

b. Noxious Weeds

1) Proposed treatment areas in the project area are relatively weed free currently. No pretreatment or weed spraying before prescribed burning, thinning, or timber harvest activities will be necessary as there is no recorded weed populations to treat in those specific areas.

2) Noxious weed surveys/inventories will be done 1 year post-project on all open and closed system and temporary roads affected by the project activities. Heavy equipment will be cleaned and inspected prior to coming on the project area. Seed, straw and other materials used for road decommission and erosion control will be certified weed free. All disturbed roads, landings and skid trails will be seeded with an approved certified weed seed free native seed mix after activities occur.

3) Sawmills are often known to have noxious weeds located on their premises, especially in Ashland, due to often a sawdust base, as well as the numerous different types of vehicles traveling in and out of them. Vehicles or equipment from those areas will be washed, as well, the project will meet other Best Management Practices for noxious weeds highlighted in the weed report.

4) Main thoroughfare roads will automatically be incorporated into the weed programs inspection, and possible broadcast spraying with chemicals known to impact pioneer species and not native species as a preventative measure.

5) Measures include whether noxious weeds show up on the landscape during inventory.

(Rangeland Management/Noxious Weeds Report, pp. 14-15, project record).

7. Sale Area Improvement and Hazard Reduction Opportunities

The following is a list of proposed activities by priority that would have potential to be funded with Knutson-Vandenberg (KV funds) from any commercial sale receipts and Brush Disposal (BD funds). Funding could be a combination of KV, BD and appropriated funds to meet the multiple objectives.

KV Funds Priority

1. Required Reforestation – Monitoring
2. Known Existing Noxious Weed Treatment and Monitoring
3. Pre-commercial Treatment within Harvest Units
4. Non-commercial Aspen and Woody Draw Treatments
5. Directional Tree Felling within Woody Draw Areas
6. Broadcast Burning (Forest and Non-Forest)
7. Decommission Roads

BD Funds Priority

1. Burn Landing Piles
2. Rehabilitate Landing Piles
3. Fireline Construction
4. Prescribed Burning

ENVIRONMENTAL CONSEQUENCES

This section describes the environmental impacts of the proposal and alternatives in relation to whether there may be significant environmental effects as defined at 40 CFR 1508.27. Further analysis and conclusions about the potential effects, including cumulative effects are available in the Resource Specialist Reports and other supporting documentation located in the project record. The project record, which is available at the Ashland Ranger District in Ashland, Montana, as well as the Supervisor's Office in Bozeman, Montana.

This assessment is consistent with the National Forest Management Act and tiers to the Final Environmental Impact Statement (FEIS) and Land and Resource Management Plan (Forest Plan) for the Custer National Forest, dated October 1986, the Record of Decision being signed on June 10, 1987, as amended. The following are discussions of resources that have relevance to a determination of significant effects.

Past, Present, and Reasonably Foreseeable Future Actions

Past Actions are addressed by the Council on Environmental Quality [1] (CEQ) in the following manner, "Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."[2] In other words, the effects of all past actions have created the current affected environment/existing condition, consequently specific past actions do not need to be identified for the cumulative impacts analysis. However, in general, past actions include grazing, timber harvest, mining and exploration, recreational camping, prescribed burning, and small product removal (i.e., post and poles, and firewood).

Present Actions are typically ongoing activities and are treated similarly to past actions. Anticipated future changes in these activities are included under reasonably foreseeable actions.

Reasonably Foreseeable Actions are those which are formal proposals or decisions not yet implemented at the time of the analysis. Activities that add to the effects of designated travel routes include wildfires, timber harvesting, fuel reduction, livestock grazing, and recreational uses (hunting, hiking, motorized recreation, etc.). These activities will continue to influence the landscape. These reasonably foreseeable and ongoing (previously planned) activities on NFS lands described below, have been considered in the effects analysis, including cumulative effects:

- On eastern portions of the Forest, Ashland and Camp Crook, recreation may be described and experienced differently as inherent to permittees' livelihood and way of life, experienced while ranchers manage allotments, check cows, and visit neighbors. (Assessment Forest Plan Revision, Final Recreation Settings, Opportunities, and Access Report).
- On-going and into the foreseeable future, dispersed recreation includes hunting, camping that is most often associated with hunting, some fishing, horseback riding, some bird watching, Off Highway Vehicle use within the project area.
- On-going and into the foreseeable future, grazing – There are five grazing allotments within the Three Mile Project Area: Coleman Draw, Lower Home, Shorty Creek, 10 Mile, 10 Mile/3 Mile, Upper Home. These allotments are all made up of three and four pasture deferred grazing systems with a total of 22 different pastures within the project area that are rotated annually in these allotments from May to November each year.. There are 1,720 cow/calf pairs permitted to graze annually, owned by twelve different permittees, are authorized to graze. Permitted stocking rates in the project area range from 2.2 to 4.2 acres per Animal Unit Month (AUM) but can be reduced each year at the

[1] CEQ is the agency responsible for promulgation of regulations and guidance for the National Environmental Policy Ac
[2] CEQ's June 24, 2005 Memo.

request of the permittee. These five allotments have 160 stock water improvement, including springs, wells, reservoirs, and 45 miles of extensive pipeline systems. Monitored range conditions in these allotments varies from some areas of fair to most areas in good condition throughout the project area. These allotments are subject to specifications in their respective allotment management plans.

- On-going and into the foreseeable future, implementation of the Ashland Travel Management decision (2009). This means, in part, enforcement of the decision that identified routes open to public motorized use.
- On-going and into the foreseeable future incidental firewood cutting.
- On-going and into the foreseeable future, wildfire suppression. Fluctuations in fuel loadings will continue indefinitely in the Threemile area as forested stands progress through succession with or without wildfire.
- Annual recurring maintenance of roads, trails, and other facilities/infrastructure. Road maintenance typically includes roadside brushing, surface grading, and minor culvert and drainage repairs. Fence-lines and stock tanks are cleared and brushed.
- On-going route decommissioning (roads and/or trails) of routes identified in the 2009 Ashland Travel Management decision and the subsequent Ashland Ranger District Final Road Maintenance, Decommissioning NEPA decision (USDA 2016).
- On-going and into the foreseeable future, herbicide treatments authorized in the Custer National Forest Weed Management Record of Decision and attendant Final EIS (USDA Forest Service. 2006). A total of 542 gross acres are impacted by spotted knapweed with 133 acres of actual infestation are treated within the project area, annually.
- Past Harvest – This is summarized in the project record from the FACTS database (Forest Service Activity Tracking System). Commercial harvest of 235 acres occurred in the project area in 1989.
- Fuels and pre-commercial thinning in the understory (generally less than <8" in diameter) was done to reduce ladder fuels and/or create a fuel bed. This occurred in 2009, 2010 and 2011 across about 4,270 acres. This activity occurred generally along roads, along perimeters and scattered pockets. Less than 15% of the acreage was affected by treatment activity.
- Past broadcast burning – since 2010 and 2012 there has been 2,334 acres burned (FACTS).
- Past pile burning – There has been 1,137 acres of pile burning, of which 902 acres have been treated since 2002. (FACTS).
- Past thinning for hazardous fuels reduction – 3,458 acres has been thinned since 2009 (FACTS).
- Past pre-commercial thin – 471 acres in 2009 (FACTS).
- Past (54 acres in 2012),.and on-going into the foreseeable future, coniferous planting.
- Various past and on-going wildfires – 22,576 acres. These acres were burned in a number of wildfires, some of which are listed here include, but not limited to: Ash Creek (2012), Watt Draw (2006), Tobin (2000), Shorty (2009), Yager Butte (2006), Threemile, and Coal (2015) fires. There are numerous other small fires (often less than 10 acres) suppressed annually
- Special Uses - Past, on-going into the foreseeable future, an annual horse endurance ride. The group uses the same trails each year.

- Special Uses – Past, on-going into the foreseeable future, Otter Creek Outfitters and Doonan Gulch Outfitters are both permitted to conduct day trips on the District. Otter Creek Outfitters permit area includes all of the Threemile project area, but also extends further south to Fifteenmile Road and east to the District's eastern boundary, staying south of Highway 212 (Project Record).
- On-going reconstruction and re-alignment of Hwy 212. The work to be completed lies within the right-of-way granted to Federal Highways Administration. Highway 212 crosses landownership that is mostly other than National Forest System lands north of the project area.
- Private landowners graze private in-holdings in the winter and grow hay in the summer.
- Past wildfire private landownership – 743 acres (2006).
- To the best of our knowledge, the private land adjacent the area in Threemile Creek was harvested, and then burned in 2009 during an escaped prescribed burn, which impacted roughly 235 acres of private land.

Forest Vegetation
Proposed Action, Alternative A

Direct, Indirect, and Cumulative Effects
Direct effects for this analysis is the effects of implementing the treatment, these are described in terms of post treatment. Indirect effects are what happens as stands continue to grow and develop post treatment and are displayed for this analysis 20 years from treatment.

The overall intent for forest vegetation management is to change existing forest vegetation composition and structure to conditions that may be more resilient to disturbances such as outbreaks of pine beetles (MPB and engraver beetle) and wildfires, by creating variable densities of individual trees, providing for clumps and creating openings (ICO concept). Wildfire hazards are discussed in detail in the Fire and Fuel Management section below.

Outbreaks of mountain pine beetle and large uncontrollable stand replacement wildfire have the greatest chance to affect the forest vegetation in the Threemile project area due to existing and projected forest composition and structure. Both of these disturbance events may result in socially unacceptable consequences. It is not the intent to beetle proof or fire proof the forest vegetation as these processes are important in the forest system and will all ways be a process on the landscape in these forest types. Three forest vegetation attributes that may determine whether there could be high mortality if an outbreak of mountain pine beetle were to occur include:

- Species (species dominance),
- Size class (successional status), and
- Horizontal structure (BA/ac.)

The following discussion summarizes the effects of the alternatives, with a focus on the above noted forest vegetation attributes and a brief discussion of how the proposed treatments affect those attributes. The Forest Vegetation Vertical Structure (canopy layers) is an important attribute for fire hazard and will be discussed across the proposed treatments and Alternatives.

Species Dominance
Cover type after a disturbance is determined by site conditions, species present (pre and post disturbance) and seed availability. Ponderosa pine is the only conifer cover type in the project area and is a host to both MPB and the pine engraver beetle. Green ash cover type (woody draws) is confined to draws on less than three percent of the project area, no standalone treatments are proposed. However, incidental green ash that fall within the proposed harvest units will have 90% of the ponderosa pine removed (see Table 1 – WD treatment; as well as Table 1 in Scoping Document). Ponderosa pine will stay the dominant cover type throughout the time periods across all proposed treatment types. An additional 240 acres of ponderosa pine cover type will be established by planting in the wildfire areas that currently is lacking an adequate seed source to reforest naturally. About 3,414 acres in the northern portion of the landscape will continue to reestablish ponderosa pine forest cover over the next decade as areas with a seed source post fire continue to reforest naturally. (Forest Vegetation Report, pp. 27-28, project record).

Forest Vegetation Composition (Size Class and Age)
A direct effect of the small regeneration treatments (REGEN ST and CTM small openings) will initiate a new age class of ponderosa pine to create age class diversity. Alternative A accomplishes this on approximately 778 acres. Indirectly the ICD (commercial thin from below on dry sites – to restore widely spaced large open grown conditions) will initiate a new age class on 948 acres while still maintaining a large tree component. Average age classes in the larger tree classes will not be altered in the CTM thinning treatment areas (954 acres) designed to thin from below, they maintain the larger trees with the existing age class. A new age class will be created in the PLT treatments that have existing forest cover on 13 acres and on 240 acres of burned areas that are currently non-forested. No treatment areas and the No Action Alternative will maintain the existing age classes. There will be trees regenerating in the understories of these intermediate (ICD and CTM thin areas) and no treatment areas that will be a younger age, however the over story trees age will be the dominant age class. Small areas of old growth that were identified during field sampling and any additional found during implementation will be maintained (see Design Criteria Common to Action Alternatives above). Additional old growth will be promoted overtime by retention of larger trees within some of the treatment areas. (Forest Vegetation Report, p. 28, project record)

The main objective for the RXB PP and RXB NF treatments is not intended to create new age classes, however canopy openings up to 1 acre in size on less than 1 percent of the treatment unit may occur where a new age class will be started. Understories are likely to reinitiate post treatment. (Forest Vegetation Report, p. 28, project record)

Across the forested acres small disturbances (insects, disease, wind, snow, etc.) will occur and take out individual trees creating openings in the canopy, this may initiate regeneration, but the dominate age class will be the over story. (Forest Vegetation Report, p. 28, project record)

Woody draw treatments (WD) were designed to remove ponderosa pine, while maintaining all green ash and other deciduous species. With preference to leave the older larger ponderosa pine trees this age class will still be represented. A new age classes of green ash is anticipated beyond 2021 as a result from opening up the canopy. New germinates of green ash from seed are

anticipated and root suckering could occur post prescribe burn. (Forest Vegetation Report, p. 28, project record; Forest Plan, pp. 83-84, project record).

Under Alternative A about 16% of the treated 4,759 acreage post treatment will initiate a new age class. An additional 240 acres of existing non forest will be forested with the PLT treatment, adding acres of a new age class. The remainder of the 84% of the treated acreage will generally maintain the age class representation, with the ICD and CTM treatments targeting the older age classes for retention, Table 6 below (Table 19 in the Forest Vegetation Report). This is in comparison The No Action Alternative which maintains the existing condition and no new age class is created, other than when small disturbances (insects, disease and storm mortality) occur. Remnant large, old trees ($\geq$ 17" dbh and $\geq$ 180 years) noted in the field surveys will be retained/protected during commercial and prescribed fire activities (see design feature section). Natural mortality (age, insects, diseases, storm damage) and applying prescribed fire could reduce this large old tree component. (Forest Vegetation Report, pp. 28-29, project record).

Creation of a new age class is a longer term strategy to increase resiliency to MPB outbreaks (Forest Vegetation Report, pp. 17-21, project record). By changing the largely homogenous existing structure and composition in the ponderosa pine cover type, portions of the landscape will not be susceptible at the same time. This will reduce effects of a MPB outbreak if it were to occur. The REGEN ST, CTM small openings, and the PLT types of treatment specifically were targeted to create a new age class of ponderosa pine. A mix of small and medium sized openings through harvest will be created on 958 acres ranging in size from ½ to 10 acres for individual treatment units. Some of these individual openings that are adjacent will create openings up to about 21 acres. No new age class and no alteration to the ponderosa pine cover type composition and structure will occur in the No Action Alternative. (Forest Vegetation Report, p. 29, project record).

Thinning increases growing space, promoting individual tree growth (increased diameter). Thinning from below and prescribed burning to reduce the understory components leaves the larger trees that in addition have an influence in the increase of acres in the large tree size class. (Forest Vegetation Report, p. 29, project record).

Forest Vegetation Structure – Horizontal (Basal Area/Acre and Canopy Cover) and Vertical (Canopy Layers).

Horizontal - Basal Area

Basal area per acre (in combination with diameter) is an important attribute in determining potential hazards for the insect of concern (MPB). Eighty square feet per acre and QMD's $\geq$ 6 " is the break between a low hazard rating and moderate hazard rating for MPB (see interpreting MPB hazard in the Forest Vegetation Report, p. 32, project record).

Type of treatment activity, existing stand conditions, and existing site condition are a function of existing and future average basal areas. Table 16 in the Forest Vegetation Report on p. 32 displays how basal area changes from treatment types and how they change as stands reestablish or increase in growth over the 24 year time period. Regeneration harvests (REGEN ST), improvement cutting on dry sites (ICD), and small openings in the commercial thinning (CTM) remove the most trees thus the largest reductions in BA post treatments. Commercial treatments ICD, CTM and REGEN ST are the only treatments that thin trees to a post treatment basal area <

80 ft^2 and remain less < 80 ft^2 through 2041 on 100% of the treatment acres. ICD and CTM treatments are designed to leave existing clumps with interlocking crowns on up to 8% of the treated area where available. These clumps will have BA's that exceed 80 ft^2. (Forest Vegetation Report, p. 32, project record).

The RXB and the RXB NF treatments are designed to have small reductions in the over story with high reductions in the understory. The larger trees with added growing space continue to grow adding BA. By 2041 the amount of acres less than 80 ft^2 return to existing levels and there is a 21.4% increase in acres in > than 120 ft^2 (See Table 16 in the Forest Vegetation Report, pp. 32-33, project record).

NO TREAT acres in Alternative A promote 91.9% of the forested acres with BA's $\geq$ 120 (59.5% of the forested project area). Overall Alternative A promotes 40.4% $\geq$ 150 BA compare to the No Action Alternative at 68.4% (Table 23). Woody draw treatments would be expected to reduce BA's to less than 80 ft^2 through 2041. PLT acres on the existing forested acres (13) would continue to have BA's > 80 ft^2 where large trees exist. On the new forested acres to be planted (240) BA's would be very low by 2041, about 2 ft^2. (Forest Vegetation Report, p. 32, project record).

Horizontal - Canopy Cover

Canopy cover is a horizontal structure of forest vegetation that implies density. High canopy cover generally equates to full occupancy or near full occupancy of growing space. When full occupancy occurs or when nutrients, water or light are limited trees have to compete. When competition is high stand and tree vigor can be weakened making them more susceptible to insect and disease attack and prone to wind and snow damage events. High canopy cover can also be a factor for potential fire type. Continuous canopy cover (>40%) is more likely to sustain an active crown fire under certain weather conditions. (Forest Vegetation Report, pp. 33-34).

ICD, CTM, and REGEN ST have the greatest impact on changing canopy cover from existing (see Table 17 in the Forest Vegetation Report, pp. 35-36, and Sandbak, 2018H). (Forest Vegetation Report, pp. 33-34, project record).

Vertical – Canopy Layers

Canopy layers can have an impact on the potential type of fires. Continuous canopy layers create a ladder type effect for fires burning on the surface to burn up into the crown and potentially become a crown fire. Table 18 in the Forest Vegetation Report displays the acres of canopy layer types by treatments in Alternative A by time period. Single and two story canopy layers have the lowest potential for surface fires burning and jumping into the crowns. Without treatment (NO TREAT acres) stands continue to grow and are maintained throughout the time period by a domination of continuous canopy layers (See Table 18 in the Forest Vegetation Report, p. 38). Even with treatment stands will develop additional layers overtime. (Forest Vegetation Report, p. 36, project record).

Commercial treatment areas have the largest impact on the canopy layers in 2021 (post treatment) as thinning treatments are thinning from below removing the ladder fuels. Small

openings have an effect by changing to a single story of new seedlings. Ponderosa pine would tend to become 2 story over time if no disturbances (large or small) occur as all growing space get taken up and limited regen occur. The mid story grows into the upper canopy layer resulting in 2 layers (over story with a limited regeneration layer). Small disturbances (insects, disease, wind/storm events, and low intensity fire) created growing space which promoted the multiple canopy layers in the existing condition. Had fire suppression not occurred over the last 100 years or so, and if high frequency, low intensity fire had been allowed to happen the landscape would be more dominated by two and single story structures. (Forest Vegetation Report, p. 36, project record).

Cumulatively post treatment (2021) Alternative A has 26.5% with a single canopy layer, 8.1% with 2, and 65.4% with 3 or more canopy layers (Table 25, Sandbak, 2018H). By 2041, one percent has a single layer, 29.1% 2 layers, and 69.9% has 3 or more layers. In comparison the No Action in 2021 has 97.3% with continuous layers and 2.7% with a single layer. By 2041, this changes to 0.2% with a single layer, 2.5% with 2 layers and 97.3% with continuous layers (Sandbak, 2018H), and Table 18). Alternative A promotes 30.1% of the area in 2 or less canopies, while the No Action Alternative promotes 2.7% (See Table 25 in the Forest Vegetation Report, p. 49). (Forest Vegetation Report, p. 37, project record).

Forest Vegetation – Pine Beetle Hazard

Approximately 99% of existing forest vegetation in Alternative A acreage is in moderate to high hazard for MPB (Table 26). Due to stand conditions (quantity and quality of available hosts); large amounts of mortality could be expected if an outbreak were to occur. (Forest Vegetation Report, p. 38, project record).

Literature suggests a long term solution to increase resiliency to MPB outbreaks is to change forest structure and composition (Fetig, Gibson, Munson, Negron, 2013). This can be done by creating small to moderate sized openings that will increase mosaics within homogenous landscapes of susceptible hosts. Outbreaks will continue to occur as long as susceptible forests and favorable weather coincide. Creation of age class and density mosaics results in landscapes that are not entirely susceptible at the same time period. Alternative A creates a new age class on about 4.2% of the existing forested project area in multiple small openings ranging in size from ½ to 4 acres size (CTM). Forty seven openings will be created ranging in size from 1.2 to 21.2 acres in size on 2.2% of the forested acres (REGEN ST). No openings will be created that exceed 40 acres. Five different density mosaics will be promoted in Alternative A using Clumps and Individual Tree Thinning prescriptions and prescribed fire on about 39% of the forested project area (Table 19). No treatment (skips) will generally promote the existing condition (TPA >25 and medium and large clumps) on about 61% of the project area. Planting in fire areas will return forest cover and create an additional 240 acres of a new age class. Table 19 displays these treatment variations by percent of existing forested acres and by percent of proposed treatment acres in Alternative A. Implementation of Alternative A will promote various densities of large ponderosa pine on about 93% of the existing forested area. All of these variations of treatments have effects on the hazard ratings for MPB and will be discussed below. (Forest Vegetation Report, p. 39, project record).

Forest Vegetation - Planting
Planting on 253 acres that currently do not have an adequate seed source in past wildfire areas. The direct effect will be these acres will be reforested and return forest cover on burned areas. Clumps of existing forested areas on the 13 acres will maintain in moderate hazard, while the 240 acres of new seedlings will be in low hazard due to quality and quantity. (Forest Vegetation Report, p. 42, project record).

Proposed Action, Modified, Alternative B

Direct, Indirect, and Cumulative Effects

Alternative B proposes the same type of treatments as in Alternative A but on a different amount of acres (Table 6 below, and Table 36 in the Forest Vegetation Report, p. 59).

Table 6: Proposed Treatment Type Acres by Alternative.

Treatment Type	Alternative A	Alternative B	Difference
RXB PP	1,466	1,141	-325 (-22.2%)
RXB NF (Forested Acres)	599	398	-201 (-33.5%)
ICD	949	1,070	+121 (+11.3%)
REGEN ST	264	467	+203 (+43.5%)
CTM w/small openings	1,468	1,404	-64 (-4.3%)
PLT Existing Forest Cover	13	13	0 (0.0%)
Sub Total	4,759	4,493	-266 (-5.6%)
PLT Existing Non Forest Cover	240	240	0 (0.0%)
No Treatment	7,378	7,644	+266 (+3.5%)
Total	**12,377**	**12,377**	**0**

Forest Vegetation Composition (Size Class and Age)

Like Alternative A, a direct effect of the small regeneration treatments (REGEN ST and CTM small openings) is initiation of a new age class of ponderosa pine to create age class diversity. Alternative B accomplishes this on approximately 958 acres (see Table 41 in the Forest Vegetation Report, project record). Indirectly the ICD treatments will initiate a new age class while still maintaining a large tree component. Existing average age classes in the larger trees classes will be maintained in the CTM thinning treatment areas (913 acres - Table 6, above). Similar to Alternative A, PLT treatments (240 acres) will create a new age class. No treatment areas will maintain the existing age classes. There will be trees regenerating in the understories of these intermediate (ICD and CTM thin areas) and no treatment areas that will be a younger age, however the over story trees age will be the dominant age class. (Forest Vegetation Report, p. 60, project record).

About 21% of the treated 4,493 acreage post treatment will initiate a new age class (see Table 41 in the Forest Vegetation Report, project record). Like in alternative A the PLT treatment of 240 acres will reestablish forest cover, while creating a new age class. Seventy nine percent of the treated acreage will generally maintain the age class representation, with the ICD, CTM and RXB treatments targeting the older age classes for retention (Table 6). In comparison The No Action Alternative maintains the existing condition and no new age class is created, except when small disturbances (insects, disease and storm mortality) occur. This action alternative also retains/protects large, old trees ($\geq$ 17" dbh and $\geq$ 180 years) (see Design Criteria Common to the Action Alternatives section above). Natural mortality (age, insects, diseases, storm damage) and applying prescribed fire could reduce this large, old tree component. (Forest Vegetation Report, p. 60, project record).

As described above in Alternative A, a new age class is a longer term strategy to increase resiliency to MPB outbreaks (see insect hazard section below). The REGEN ST, CTM small openings, and the PLT types of treatment specifically were targeted to create a new age class of ponderosa pine. A mix of small and medium sized openings through harvest will be created on 958 acres ranging in size from ½ to 10 acres for individual treatment units. Some of these individual openings that are adjacent will create openings up to 22 acres. No new age class will occur in the No Action Alternative. (Forest Vegetation Report, p. 60, project record).

As in Alternative A the RXB PP and RXB NF treatments are not intended to create new age classes, however canopy openings up to 1 acre in size on less than 1 percent of the treatment unit may occur where a new age class will be started (Table 14). Understories are likely to reinitiate post treatment, where overstory canopy mortality occurred resulting in available growing space. As with Alternative A small natural disturbances (insects, disease, wind, snow, etc.) will continue to occur across all the forested acreage that may initiate regeneration. Where WD treatments occur, they will have the same effect as described in Alternative A above. (Forest Vegetation Report, p. 60, project record).

Forest Vegetation Structure – Horizontal (Basal Area/Acre and Canopy Cover) and Vertical (Canopy Layers)

Horizontal - Basal Area

Effects of basal area are the similar to those described in Alternative A and the existing conditions described in the Forest Vegetation Report in the project record.

Table 38 in the Forest Vegetation Report (project record) displays how basal area changes from treatment types and how they change as stands reestablish or increase in growth over the 24 year time period for Alternative B. Like in Alternative A above, regeneration harvests (REGEN ST), improvement cutting on dry sites (ICD), and small openings in the commercial thinning (CTM) remove the most trees thus the largest reductions in BA post treatments (Table 38 in the Forest Vegetation Report, project record). Commercial treatments ICD, CTM and REGEN ST thin trees post treatment to < 80 ft^2 and remain < 80 ft^2 in 2041 on 100% of the treatment acres. Retained clumps in the ICD and CTM treatments will have BA's that exceed 80 ft^2. (Forest Vegetation Report pp. 62-63, project record).

The same effects as described above for Alternative A occur in this Alternative but on 526 fewer acres in the RXB PP and RXB NF treatments. By 2041 the amount of acres less than 80 ft^2 return to existing levels and there is a 21.4% increase in acres in > 120 ft^2 (Table 38 in the Forest Vegetation Report). (Forest Vegetation Report pp. 62-63, project record).

NO TREAT areas in Alternative B promote 91.5% of the forested acres with BA's $\geq$ 120 in the project area (57.6% of the project area - Table 38). Overall Alternative B promotes 40.7% $\geq$ 150 BA compare to the No Action Alternative at 68.4% (Table 46). Effects on the WD and the PLT acres are the same as described in Alternative A. (Forest Vegetation Report pp. 62-63, project record).

Horizontal - Canopy Cover

Canopy cover effects are the same as described above in Alternative A. Like in Alternative A, ICD, CTM, and REGEN ST treatments have the greatest impact on changing canopy cover from existing (Table 39 in the Forest Vegetation Report; Sandbak, 2018I; project record). (Forest Vegetation Report pp. 63-65, project record).

By comparison in the No Action Alternative across all the treatment areas the existing condition of domination of canopy cover < 40% pretreatment continues to develop. By 2041 seventy

percent of the acreage is 40% and greater with 29.4% in the 60% plus class (Table 46 in the Forest Vegetation Report, project record). (Forest Vegetation Report, p. 64, project record).

Vertical – Canopy Layers

Effects of canopy layers are similar to Alternative A as described above. Alternative B has 266 acres less treatments and a different amount acreage within most of the treatments (Table 36 in the Forest Vegetation Report, project record). Like Alternative A commercial treatment areas have the largest impact on the canopy layers in 2021 (post treatment) with the designed thinning from below treatments that remove the ladder fuels and regeneration treatments designed to create a single story new age class.). (Forest Vegetation Report, pp. 65-67, project record).

Forest Vegetation – Pine Beetle Hazard

Approximately 99% of existing forest vegetation in Alternative B acreage is in moderate to high hazard for MPB (Table 48 in the Forest Vegetation Report, project record). Due to stand conditions (quantity and quality of available hosts); large amounts of mortality could be expected if an outbreak were to occur. (Forest Vegetation Report, p. 68, project record).

Like described above in Alternative A creation of age class and density mosaics results in landscapes that are not entirely susceptible at the same time period. Alternative B creates a new age class on about 4.0% of the existing forested project area in multiple small openings ranging in size from ½ to 4 acres size (CTM). Sixty six openings will be created ranging in size from 0.2 to 22.1 acres in size on 3.9% of the forested acres (REGEN ST). No openings will be created that exceed 40 acres. Five different density mosaics will be promoted using clumps and individual tree thinning prescriptions and prescribed fire on about 37% of the forested project area (Table 41). No treatment (skips) will generally promote the existing condition (TPA >25 and medium and large clumps) on about 63% of the project area. Planting in fire areas will return forest cover and create an additional 240 acres of a new age class. Table 41 displays these treatment variations by percent of existing forested acres and by percent of proposed treatment acres in Alternative B. Implementation of Alternative B will promote various densities of large ponderosa pine on about 91% of the existing forested area. All of these variations of treatments have effects on the hazard ratings for MPB and will be discussed below. (Forest Vegetation Report, p. 68, project record).

Effects to the forest vegetation for beetle hazard are similar to those discussed above in Alternative A. The difference is a different set of treatment acres as noted in Table 36 in the Forest Vegetation Report in the project record. (Forest Vegetation Report, p. 69).

Forest Vegetation - Planting

Alternative B effects from planting are those described in the existing condition and in Alternative A above. Planting on 253 acres that currently do not have an adequate seed source in past wildfire areas. The direct effect will be these acres will be reforested and return forest cover on burned areas. Clumps of existing forested areas on the 13 acres will maintain in moderate hazard, while the 240 acres of new seedlings will be in low hazard due to quality and quantity. (Forest Vegetation Report, pp. 42 and 70).

Do the proposed treatments meet the purpose and need for action to promote ponderosa pine and restore the ponderosa pine ecosystem towards a more heterogeneous forested landscape with a diverse age, structure (including old growth), and patch size that are more resilient to natural disturbances?

Regeneration treatments contribute to the desired future condition (Desired Condition above) by reducing beetle and fire hazard, increasing pattern diversity and increasing the mosaic of a different size class and age types of the forest vegetation. (Forest Vegetation Report, pp. 85-86, project record).

Table 7: Regeneration Treatments Creating a New Age Class and Acres by Alternative

Alternative	REGEN ST Acres	CTM Small Opening Acres	Total Acres
A	264	514	778
B	467	491	958
No Action	0	0	0

Regeneration treatments do the following to meet the purpose and need at the treatment level (treated acres):

- Alternative B has 180 more acres of regeneration treatments than Alternative A and 958 more than the No Action Alternative.
- Within treated units, regeneration treatments alter forest vegetation composition and structure to reduce hazards to large disturbances events (MPB outbreaks and crown fire) that may result in widespread tree mortality.
- Treatments remove the current susceptible host and create a new age and size class that reduce the amount of area susceptible to MPB at one time (Tables 15 and 37).
- Regeneration treatments reduce continuous canopy layers (ladder fuels) for wildfire to climb up into the canopy that could result in high mortality and maintain it in single story or two story in the 20 year post treatment period (Tables 18 and 40).
- High conifer canopy cover is reduced post treatment, but will eventually reestablish by 2041 unless additional stocking control is done in the newly developed cohort (Tables 17 and 39).
- The combination of high canopy cover (>40%) and continuous canopy layers are reduced for 20 years post treatment, reducing risk of crown fires.

(Forest Vegetation Report, pp. 85-86, project record).

Intermediate treatments contribute to the desired future condition (see above) by reducing fire hazard (see fuels section), altering existing non resilient vertical and horizontal structure in the ponderosa pine cover type, promoting large ponderosa pine trees, and restoring green ash cover types in the project area. (Forest Vegetation Report, p. 87, project record).

Table 8: Intermediate Treatments and Acres by Alternative

Alternative	ICD Acres	CTM Thinning Acres	RXB PP Acres	RXB NF Acres	Total Acres
A	949	954	1,466	599	3,968
B	1,070	913	1,141	398	3,522
No Action	0	0	0		0

Alternative A treats 446 acres more than Alternative B. Predominant treatment acres are intermediate (83% for Alternative A and 78% Alternative B) and effects as indicated above last 15 to 40 years as demonstrated in Tables 16, 17, 18, 38, 39, and 40 at 20 years post treatment. From 2021 to 2041 trees continue to grow (expansion of crowns, understory development,

increased basal area) and acres greater than 40% canopy cover increase, 3 or more canopy layers develop and acres in basal areas greater than 80 ft^2 increase. This continued development has a negative effect on resiliency to disturbances. Additional treatment (thinning and/or prescribed fire) would need to occur to maintain post treatment conditions. (Forest Vegetation Report, pp. 86-87, project record).

The action alternative's best meet the purpose and need based on acres treated versus no acres treated under the No Action Alternative. (Forest Vegetation Report, pp. 81, 87, 88, and 89, project record).

Do the proposed treatments meet the purpose and need for action to provide wood products to contribute to employment and industry in local communities and help support the sustainable supply of timber from National Forest System lands?

Commercial Treatments (ICD, CTM and REGEN ST)

Approximately 2,681 acres in Alternative A and in Alternative B 2,941 acres will be treated commercially and provide for wood products to local industry (see the Economics section below and the Economics Report in the project record). Alternative B commercially treats 260 more acres than Alternative A. The No Action Alternative does not provide wood product, therefore does not meet the purpose and need for action. (Forest Vegetation Report, pp. 87-88, project record).

Do the proposed treatments meet the purpose and need for action to lessen the potential spatial extent and intensity of disturbances (such as high mortality form beetles)?

Regeneration Treatments (REGEN ST and CTM Small Openings)

Alternative A treats 778 acres and Alternative B 958 acres (Tables 19 and 41). Alternative B treats 180 more acres. Regeneration treatments do the following to meet the purpose and need at the treatment level (treated acres):

- Regeneration harvest creates a new age class of trees, which is a longer term strategy to increase resiliency to MPB outbreaks.
    - By altering the largely homogenous existing structure and composition in the ponderosa pine cover type (largely on the southern portion and non-wildfire areas), portions of the landscape will not be susceptible at the same time. This will reduce effects of a MPB outbreak if it were to occur. This is demonstrated in photos 3.1.1 and 3.1.7.

(Forest Vegetation Report, p. 88, project record).

The action alternative's best meets the purpose and need based on acres treated versus. no acres treated under the No Action Alternative. (Forest Vegetation Report, pp. 81, 87, 88, and 89, project record).

Intermediate Treatment (ICD, CTM thin areas, RXB PP, RXB NF and WD)
Intermediate treatments do the following to meet the purpose and need at the treatment level (treated acres):

- Post treatment Alternative A increased low hazard by 20.9% and Alternative B increase it by 22.9% (Tables 26 and 48). On the treated acres post treatment, Alternative A increases low hazard by 52.9% and Alternative B by 61.8% from that in existing condition (Tables 21 and 43). About 69.1% of the increase in Alternative A and 65.5% in Alternative B is due to these intermediate treatments (Tables 20 and 42).
- The action alternatives reduce the amount of acres that could experience large mortality if an outbreak of MPB were to occur over that in the No Action Alternative. Alternative A increases low hazard by 12.7% and Alternative B increases it by 15.1% over that of existing low hazard for the post treatment time period from 2017 to 2041 (Tables 26 and 48). On the treated acres post treatment, Alternative A increases low hazard by 35.3% and Alternative B by 43.9% from that in existing condition (Tables 21 and 43). About 53.7% of the increase in low hazard acres on the treated acreage is due to intermediate treatments in Alternative A and 51.5% in Alternative B (Tables 20 and 42).
- RXB PP and RXB NF treatments do not reduce the MPB hazard rating less than a moderate on the treated acreage because the quality and quantity of the host (i.e. ponderosa pine > 8" DBH) is still present, and is therefore a less effective treatment compared to regeneration harvest and ICD treatments (Tables 20 and 42). CTM thinned treatment areas reduce MPB hazard to low post treatment, however with continued stand growth MPB hazard increases to moderate 20 years post treatment. Retained clumps (CTM and ICD) and the heavier residual over story stocking in the RSXB PP and the RXB NF remain at moderate/high.
- Thinning ponderosa pine stands may reduce the effects if a MPB outbreak were to occur. This is demonstrated in photos 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, and 3.1.8.
    - Thinning from below optimizes the effects of microclimate and decreases the ability of the beetle from finding, selecting and colonizing the host.
    - Thinning increases growing space to enhance tree vigor of the residual trees, which strengthens insect resistance mechanisms making them less susceptible to attack/mortality.

(Forest Vegetation Report, pp. 88-89, project record).

The Action alternative's best meet the purpose and need based on acres treated versus. no acres treated under the No Action Alternative. (Forest Vegetation Report, pp. 81, 87, 88, and 89, project record).

Table 9. Alternatives A and B –Proposed Acres of Commercial Treatments.

Prescription	Code	Fuels Treatment	Code	Alternative A (Acres)	Alternative B (Acres)
Commercial Improvement Cutting Activity (Dry) - Broadcast Burning: Ponderosa Pine	ICD	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	461	385

Prescription	Code	Fuels Treatment	Code	Alternative A (Acres)	Alternative B (Acres)
Commercial Improvement Cutting Activity (Dry) - No Broadcast Burning: Ponderosa Pine	ICD	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	601	761
Commercial Thinning Activity with Small Regeneration Openings (Moist) and Broadcast Burning: Ponderosa Pine	CTM	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	Thin 366-247 Small Openings 183-244 Average 610	622
Commercial Thinning Activity with Small Regeneration Openings (Moist) and No Broadcast Burning: Ponderosa Pine	CTM	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	Thin 625-729 Small Openings 312-416 Average 1041	883
Commercial Regeneration Treatment Activity (Moist) and Broadcast Burning: Ponderosa Pine	REGEN ST	Whole Tree Yarding, Lop and Scatter, and Pile Burning	RXB PP, WTY, LS, PB	109	243
Commercial Regeneration Treatment Activity (Moist) and No Broadcast Burning: Ponderosa Pine	REGEN ST	Whole Tree Yarding, Lop and Scatter, and Pile Burning	WTY, LS, PB	191	266
Commercial Treatment Activity (Ponderosa Pine) with Broadcast Burning			**Subtotal**	**1180**	**1250**
Commercial Treatment Activity (Ponderosa Pine) without Broadcast Burning			**Subtotal**	**1833**	**1910**
Total Commercial Treatment Acres				**3012**	**3160**

Table 10: Alternatives A and B - Proposed Acres of Non-Commercial Treatments and No Treatment.

Prescription	Code	Fuels Treatment	Code	Alternative A (Acres)	Alternative B (Acres)
Artificial Regeneration	PLT	To Be Determined		253	253
		Artificial Regeneration	**Subtotal**	**253**	**253**
Broadcast Burning Ponderosa Pine		Broadcast Burning Ponderosa Pine	RXB PP	2820	2497
Broadcast Burning Non-forest		Broadcast Burning Non-forest	RXB NF	1971	1508
		Broadcast Burning	**Subtotal**	**4791**	**4005**
			Total Non-Commercial Treatment Acres	**5044**	**4258**

Fire and Fuel Management

Alternative A - Proposed Action

Direct, Indirect, and Cumulative Effects

Changes to Surface and Ladder Fuel Conditions

Alternative A would quickly start to mitigate the current ecological condition in forested stands that are considered as a fire hazard with understory ladder fuel conditions. This includes about 4,653 forested acres on approximately 14 percent of the Threemile Project Area. Another 7,483 forested acres in the Project Area would not be treated. Again the majority of stands in the project area will not be treated. (Fire & Fuel Management Report, p. 33, project record).

Ponderosa pine will still persist as the dominant forest cover type across the landscape after treatment, with some understory. With Alternative A, the forest canopy in treated areas would greatly decrease, which includes the horizontal and vertical configuration of ladder fuels. This changes the fuel model from heavier fuels and/or ladder fuels to more of a grass understory model, changing from a Fuel Model (FM) 10 (FM10) to a Fuel Model (FM2).

Alternative A calls for commercial treated stands, and in some cases, those stands being treated later by prescribed burning. Since the project is trying to stress resiliency of a stand as a wildfire occurs, it is assumed that wildfire will eventually go through stands across the Project Area. (Fire & Fuel Management Report, p. 34, project record).

The following photograph on the District illustrates the individual stand effects from a commercial harvest, followed later by a wildfire burning through the stand at 10 years post-harvest, and a prescribed fire burning another 13 years later. (Fire & Fuel Management Report, p. 34, project record).

There are a few stumps remaining, some dead and down remaining, and some regeneration occurring. The fuel models in the photo represent Fuel Models 1 and 2, grass models that carry surface fire, and not torching or crowning fires. Again, the intent of the Threemile project treatments is to remove ladder fuels and canopy in some stands, and create resiliency to the remaining trees when wildfires pass through. (Fire & Fuel Management Report, p. 34, project record).

Figure 3. S2 T6S R44E – Ashland Ranger District (Post harvest, wildfire and rx fire)

The effectiveness of the proposed thinning and fuel treatments would be expected to last for approximately 20 years. This estimated time is consistent within stated fire intervals across the District. More importantly, it is also consistent with previous on-site District treatment examples, and when stands transition back to ladder fuels and more canopy cover if fires do not occur.

Changes in Fire Behavior and Firefighter Safety

Currently 63 percent of the Threemile landscape is made up of grass dominated fuel models which are grasslands, areas of previous stand replacing wildfires in timber stands, scattered burned timber stands, and areas of sparse vegetation. Fires occurring in these vegetation types are typically of low intensity and severity, but are generally faster moving, generating flame lengths from 0-4 feet, but at times up to 8 feet in length. Ponderosa pine stands make up approximately 37 percent of the Project Area, with canopy densities ranging from 10 to 60 percent (roughly half of the stands exceed 40 percent). (Fire & Fuel Management Report, p. 35, project record).

Alternative A would treat 4,653 acres of forested stands and increase the amount of fuel types that are considered non-lethal, or dominated by grass, to 77 percent (25,395 acres). In essence, all treatments (commercial harvest, thinning, or Rx fire) are designed for timber stands to

maintain, or transition to, Fuel Model 2, which is open canopy pine stands with a grass understory. Again, this is done by removing ladder fuels of mostly pine and juniper, and reducing canopy covers by removing large trees. (Fire & Fuel Management Report, p. 35, project record).

Fuel removal by harvest and/or prescribed burning is expected to modify fire behavior under forested canopies. The chance of fire spread from surface to aerial fuels would be greatly reduced by thinning out the understory tree regeneration and elevating the canopy base heights. Following implementation of Alternative A, the stands will become more open and less dense with very little fuel ladder development. There will be an increased fine fuel grass component, which generally causes more rapid fire spread (ie. 6 chains to 30 chains/hr as previously shown, but highly dependent on wind). Potential surface fires will likely have lower heat intensities, burn less severely, and result in lower tree mortality than is experienced in fires that burn in a torching or crowning manner. Flame length and BTU example differences in No Action and Action Alternative are shown in the Fire & Fuel Management Report in the table on p. 33. (Fire & Fuel Management Report, pp. 35-36, project record).

In the post treatment condition, some larger size down fuels are expected to remain on the site. And, it should be noted, the existing condition of down, larger size fuels in timber stands prior to treatment is often less than after treatment. Often, after piling activity fuels from harvest, prescriptions still direct leaving 10 tons per acre of down material after harvest to allow for that woody debris to perform many physical, chemical, and biological functions in the forest ecosystem *(Graham, et al. 1994)*. This is more than the existing condition. As well, from a fire and fuels perspective, the goal is to get the fuel model in the stand lessened to a grass dominated Fuel Model 2, which often has less than a total fuel loading of 4 tons per acre *(Anderson, 1982).* (Fire & Fuel Management Report, p. 36, project record)

The same issue occurs after prescribed burning. Specifically, after prescribed burning an initial dense timber stand, undoubtedly more tons per acre of dead and down are left on site than was present before the treatment (as shown in the previous photograph at 9.3 tons/acre). This is illustrated in the previous photograph of Unit Stand 37 of the Project Area, where prescribed burning occurred (2009). Ideally, tons per acre of larger down fuel would be reduced after treatments for the ease of future fire suppression. However, even with loads closer to 10 tons per acre, there is a medium fire spread rate, low intensity, and low resistance to control (Fischer, 1981). (Fire & Fuel Management Report, p. 36, project record).

This patchy arrangement of larger size down fuels still allows strategic options for the firefighter, aiding in suppression efforts and enhancing firefighter safety. The scattered arrangement of larger diameter size-class fuels should lessen fire intensity and mortality of residual stands. As well, another treatment of prescribed fire used as a management tool can more easily and safely be implemented. (Fire & Fuel Management Report, p. 37, project record).

The previously described effects to ecological condition and firefighter safety can be anticipated under Alternative A for the stands that are treated (4,653 acres). However, the other forested stands of 7,483 acres are likely to experience similar effects as stated under the No Action Alternative, where it is assumed that wildfire will still occur on the landscape. Those wildfires will be variable in effect from the variances associated with factors such as topography, climatic conditions and fuels conditions. (Fire & Fuel Management Report, p. 38, project record).

The Threemile Project Area is already somewhat open. It is assumed then by treating one dense timber stand, the adjacent stand's condition will not necessarily be improved, and the fire effect will not be lessened in the adjacent untreated stand. This was explained and shown under the No Action Alternative. In that explanation, fire was burning in an open fuel model, and when it reached the dense stand, the fire almost instantly began to torch making 1 to 8 acre crown runs throughout the area. (Fire & Fuel Management Report, p. 38, project record).

This scenario still fits with the Purpose and Need where individual stands are to become resilient with treatment and create a mosaic of different conditions across the area among untreated stands. (Fire & Fuel Management Report, p. 38, project record).

Long Term Effects

In the long term, or after the life of the project at approximately 20 years, treated stand vegetative transitions will again be occurring, as some fuel build up and pine regeneration will likely be established. (Fire & Fuel Management Report, p. 39, project record).

In the long term, there is not necessarily the same effect or resiliency with just one treatment of prescribed fire, as compared to mechanical thinning. As discussed earlier in the Fire & Fuel Management Report, after putting fire into a dense stand, the stand's understory and overstory do get somewhat thinned, but the dead and down fuel component becomes more than the previous existing condition. Further, due to the mosaic nature of prescribed burns, often some thickets and ladder fuels remain in place without being significantly thinned. Subsequently, the stand also has a dead and down component that adds to future fire intensity. For wildfire and prescribed fire to create an open pine stand with a grass understory, with some resiliency, multiple fire entries usually have to occur. (Fire & Fuel Management Report, p. 40, project record).

Firefighter Safety

The longer term effects of Alternative A and firefighter safety are still a factor of available fuels and then fire behavior. With the life of the project being stated at roughly 20 years, it is ascertainable in the treated stands, that most of the fuels now considered hazardous will still be absent from the stand. (Fire & Fuel Management Report, p. 43, project record).

This includes the understory ladder fuels that can provide continuity between the surface fuels and the crowns, creating a crown fire. Therefore, the crown fire potential is much less. As well, the treated stands will be much more open. In fact some stands that average over 100 large trees per acre prior to treatment, will most likely have less than 25 mature trees per acre on moist sites, and less than 10 mature trees per acre on dry sites. When a fire burns through stands with these types of tree stockings, the fire remains as a surface fire. The BTU/sq. ft (heat) is also much less on available firefighters. (Fire & Fuel Management Report, pp. 43-44, project record).).

Tactics in this type of open stand can include using flappers, combination tools, Pulaskis, or the spraying of water at the heel of the flame to quickly suppress. This allows a certain level of safety, and equipment or aircraft are usually not part of the suppression attack. (Fire & Fuel Management Report, p. 44, project record).).

The difficulty, however, comes in the form of rates of spread. More 1 hour type fuels and grass components, which are highly responsive to wind and drying out, carry the fire in a quick fashion

when a stand is opened up. The same prescription that helps make a stand resilient to a wildfire during some of the "hottest" conditions, changes the rate of spread greatly. Both the NEXUS and BehavePlus 5.0.5 modeling confirms this by showing rates of spread in Fuel Model 2, the condition after stand treatment, increasing five-fold and moving as much as .3 - .5 miles per hour (ie. 35 chains per hour). (Fire & Fuel Management Report, p. 44, project record).

An example is provided by the Dud Fire on the Ashland Ranger District in August of 2017. The fire was initial attacked at 60 acres in Fuel Model 1 during extreme conditions, with flame lengths 4-8 feet. It entered stands that had been commercially harvested, and that were also burned in the 2012 Ash Creek Fire (Fuel Models 2 with some dead and down). It was suppressed in a relatively safe manner, but because it moved so quickly and spread out through those fuel models, air attack and ground equipment were needed for the ultimate suppression. In roughly a 5 hour period, the fire moved 2.2 miles and increased to over 1,100 acres. In those fuel models, firefighters can be put in tough positions with fires moving so quickly, but again, the BTU component is much less and offers more ability to suppress more directly, or at least at the heel or flanks of the fire. Even during this fire, suppression resources were close, and adjacent, to the burning flank, to eventually head the fire off. One of the pieces of equipment actually built line against the flaming front due to the grass fuel model. (Fire & Fuel Management Report, p. 44, project record).

When it comes to firefighter safety though, there are numerous variables within the weather and topography that are difficult to predict, and that put firefighters at risk, regardless of Alternatives. As stated, the Threemile Project Area is large at over 30,000 acres, with a great variability in fuels and topography. During the early stages of a fire, and during initial attack, firefighters can usually make the most headway for suppression opportunities in treated stands, especially during periods of cooler weather and greater fuel moistures (as discussed on pp. 23, 24 under No Action in the Fire and Fuels Management Report). (Fire & Fuel Management Report, p. 44, project record).

However, once the fire is large and moving in extreme conditions, firefighter response is often the same in the Ashland area. That is, firefighters get to a grass Fuel Model 1 or Fuel Model 2, supplemented by a road, or equipment line, and hold the fire at those points, mostly by burning out the fuels between the lines and the main fire. Across the whole Threemile landscape, 77 percent of the area would have a more open fuel model with Alternative A, providing that tactic opportunity to firefighters during extreme conditions. This often provides the most safety and firefighter escape potential. (Fire & Fuel Management Report, p. 44, project record)

Prescribed Fire Maintenance

Although already touched on when discussing the number of prescribed fire treatments and resiliency, initial implementation and effects in the prescribed fire treated stands does not guarantee that this condition will continue into the future. Proactive management is required to maintain surface fuels, ladder fuels and canopy base heights to a level that will allow for lower intensity surface fires. This has been a consistent philosophy in literature and for most projects on the District. Therefore, the following management action would be recommended, even after the life of the NEPA decision, because it is so accepted in pine stands:

- Fuel treatments should be considered, evaluated and applied every 1 to 20 years to maintain less stand density, characterized by light surface fuel loading, patchy fuel

arrangement, and very little fuel ladder development. Prescribed burning would be used as the primary method of maintenance.

(Fire & Fuel Management Report, pp. 44-45).

It is most likely treatments will not occur before 3-5 years, as often it takes this amount of time to build up enough fine fuel (mostly grasses) after a fire to carry the next fire. The reason treatments could be implemented as often as one year is because prescribed burning on the Ashland Ranger District is often variable. Due to often conservative prescriptions and cooler seasons, to mitigate against escapes to adjacent private lands, prescribed burns can occur without achieving desired effects. It may be that the large dead and down fuels do not consume very well over an entire area due to fuel moistures on variable topographical aspects. And often due to associated livestock grazing, or just areas of low producing grass areas, prescribed fire does not always carry across whole large units. For example, units can range from 200 – 2000 acres. Further, the seasons in which prescribed burning occurs (spring and fall) often have shorter burn windows, and the point of extinction in fine fuels (ie. 15 percent) can occur quite quickly as shading starts to occur with shorter day lengths and higher humidity recovery. (Fire & Fuel Management Report, pp. 49-50, project record).

The intent of the maintenance understory burn treatments is to lessen the amount of larger surface fuels that have accumulated since the last treatment, and ensure mortality of some tree regeneration that has already established as dense pockets. This would ultimately dictate the need and time frame (years) of prescribed burning. (Fire & Fuel Management Report, pp. 49-50, project record).

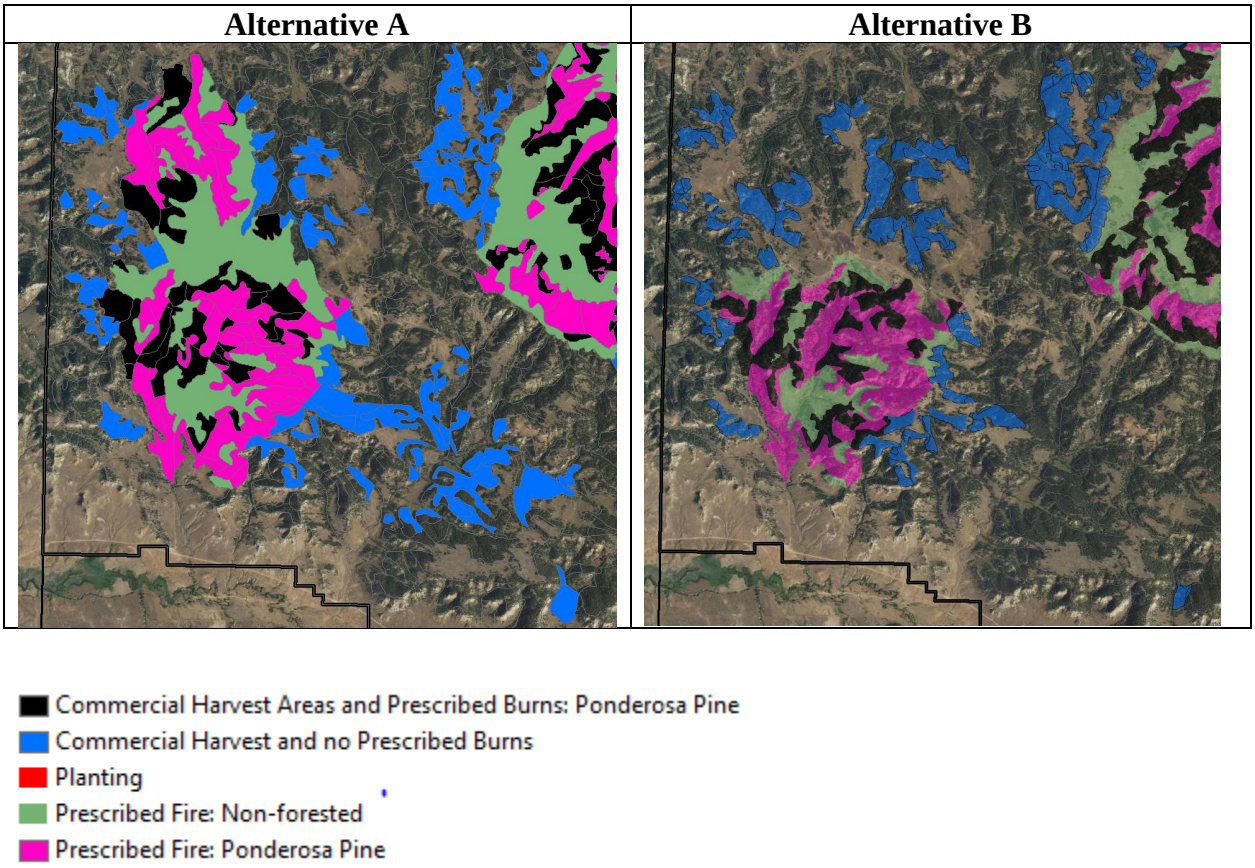

Figure 4. These images visually portray some of the major differences that occur between Alternatives A and B in the southwest portion of Project Area.

As shown in the previous mapping units in the Fire & Fuels Management Report (project record), Alternative A included a prescribed fire unit in both non-forested and forested units (shown as light green and pink) north of the Coal Creek Road feeding into Threemile Creek. Broadcast burning was dropped to lessen the amount of change in forested cover for wildlife concerns (see wildlife report) and helped shape the Alternative B treatment scenario. (Fire & Fuel Management Report, pp. 51-52, project record). See Figure 4 above.

As stated previously in effects analysis, untreated forested stands will then be susceptible to future wildfire effects as stated in the No Action Alternative. (Fire & Fuel Management Report, p. 52, project record).

Alternative A also included commercial harvest of units in the Yager Gulch area just north of the Tenmile Road. Commercial harvest was dropped to lessen the amount of change in forested cover for wildlife concerns (see wildlife report) and helped shape the Alternative B treatment scenario. (Fire & Fuel Management Report, p. 52, project record).

As stated previously in the Fire & Fuels Management Report effects analysis, untreated forested stands in the Yager Gulch area will then be susceptible to future wildfire effects as stated in the No Action Alternative. (Fire & Fuels Management Report, p. 52, project record).

Table 11. Some highlights of NEXUS fire effects modeling in non-treated forested stands in No Action and treated forested stands within Alternatives A and B:

Fire Characteristic	No Action (no treatment)	Alternative A	Alternative B
Flame length initiates torching (ft)	3.1	12.4	12.4
Potential flame length (ft)	10.4	6.8	6.8
20-ft Wind Speed (mph) to Inititate Torching (TI)	3.7	25.8	25.8
20-ft Wind Speed (mph) to sustain passive and active crown fire (CI)	19.5	42	42

The factors considered in the Table 11 are that of extreme fuel and weather parameters outlined in the Fuel & Fire Management Report on p. 15, and that have led to stand replacing fires in the past. As well, forested stands are considered mostly dense with a contiguous vertical structure that are conducive to fire spread in canopies (Fuel Model 10). Alternatives A and B change that structure in treated forested stands that are mostly open with mostly a grass understory that carries a fire (Fuel Model 2). (Fire & Fuel Management Report, p. 52, project record).

Alternative B –Proposed Action - Modified

Direct, Indirect, and Cumulative Effects

Changes to Surface and Ladder Fuel Conditions and Rangeland Ecological Condition

Alternative A and Alternative B share relatively the same treatment acres, with some minor differences in unit or treatment locations due to wildlife concerns or soil issues. (Fire & Fuel Management Report, p. 46, project record).

Treatment effects analysis would be relatively the same as analysis is based on changing forested areas to fuel models that have an open Ponderosa pine over story with a grass understory (Fuel Model 2). Therefore, please see Alternative A's effects analysis to understand the changing conditions of stands and ecological condition when treating stands and converting them to a different fuel model. (Fire & Fuel Management Report, p. 46, project record).

Some of the differences in the two action alternatives are also highlighted in the comparison tables and maps at the end of this report. The following gives some numerical format of acreages and percentages of the area during Alternative B treatment, but keeps the same written effects as Alternative A. (Fire & Fuel Management Report, p. 46, project record).

Alternative B, as with Alternative A, would quickly start to mitigate the current ecological condition in stands that are considered a fire hazard with understory ladder fuel conditions. This includes about 4,407 acres on approximately 13 percent of the Threemile Project Area. Another 7,729 forested acres in the Project Area would not be treated. (Fire & Fuel Management Report, p. 46).

Ponderosa pine will still persist as the dominant forest cover type across the landscape after treatment, with some understory. With Alternative B, the forest canopy in treated areas would greatly decrease, which includes the horizontal and vertical configuration of ladder fuels. This changes the fuel model from heavier fuels and/or ladder fuels to more of a grass understory model. (Fire & Fuel Management Report, p. 46, project record).

The effectiveness of the proposed thinning and fuel treatments would be expected to last for approximately 20 years. This estimated time is consistent within stated fire intervals across the District. It is also consistent with previous District treatment examples, and when stands transition back to ladder fuels and more canopy cover. (Fire & Fuel Management Report, p. 46, project record).

Changes in Fire Behavior and Firefighter Safety

As stated, currently 63 percent of the Threemile landscape is made up of grass dominated fuel models which are grasslands, areas of previous stand replacing wildfires in timber stands, scattered burned timber stands, and areas of sparse vegetation. Fires occurring in these vegetation types are typically of low intensity and severity, but are generally faster moving, generating flame lengths from 0-4 feet, but at times up to 8 feet in length. Ponderosa pine stands make up approximately 37 percent of the Project Area, with canopy densities ranging from 10 to 60 percent (roughly half of the stands exceed 40 percent). (Fire & Fuel Management Report, p. 47, project record).

Alternative B would treat 4,407 acres of forested stands and increase the amount of fuel models that are considered non-lethal, or dominated by grass, from 63 percent (existing) to 76 percent (25,195 acres). This is within a small percentage of Alternative A's resulting open landscape of 77 percent. In essence, all treatments (commercial harvest, thinning, or rx fire) are designed for treated stands to maintain, or transition to, Fuel Model 2, which is open canopy pine stands with a grass understory. Again, this is done by removing ladder fuels of mostly pine and juniper, and reducing canopy covers by removing large trees. (Fire & Fuel Management Report, p. 47, project record).

Fuel removal by harvest and/or prescribed burning is expected to modify fire behavior under forested canopies. The chance of fire spread from surface to aerial fuels would be greatly reduced by thinning out the understory tree regeneration and elevating the canopy base heights. Following implementation of Alternative B, the stands will become more open and less dense with very little fuel ladder development. There may be an increased fine fuel grass component, which generally causes more rapid fire spread (ie. 6 chains to 30 chains/hr as previously shown, but highly dependent on wind). Potential surface fires will likely have lower heat intensities, burn less severely, and result in lower tree mortality than is experienced in fires that burn in a torching or crowning manner. (Fire & Fuel Management Report, p. 47-48, project record).

The previously described effects to ecological condition and firefighter safety can be anticipated under Alternative B for the stands that are treated (4,407 acres). However, the other forested stands of 7,729 acres are likely to experience similar effects as stated under the No Action Alternative, where it is assumed that wildfire will still occur on the landscape. Those wildfires will be variable in effect from the variances associated with factors such as topography, climatic conditions and fuels conditions. (Fire & Fuel Management Report, p. 48, project record).

The Threemile Project Area is already somewhat open, and it is stated there still is a stand condition issue that could lead to torching, and some crown runs. It is assumed then by treating one dense timber stand, the adjacent stand's condition will not necessarily be improved, and the fire effect will not be lessened in the adjacent untreated stand. This was explained and shown under the No Action Alternative described in more detail in Fire & Fuel Management Report, project record. The explanation showed where fire was burning in an open fuel model and when

it reached the dense stand, the fire almost instantly began to torch making 1 to 8 acre crown runs throughout the area. (Fire & Fuel Management Report, p. 48, project record

This scenario fits with the Purpose and Need where individual stands are to become resilient with treatment and create a mosaic of different conditions across the area among untreated stands. (Fire & Fuel Management Report, p. 48, project record).

Long Term Effects

Firefighter Safety

The longer term effects of Alternative B and firefighter safety are still a factor of available fuels and then fire behavior. With the life of the project being stated at roughly 20 years, it is ascertainable in the treated stands, that most of the fuels now considered hazardous will still be absent from the stand. (Fire & Fuel Management Report, p. 49, project record).

This includes the understory ladder fuels that can provide continuity between the surface fuels and the crowns, creating a crown fire. Therefore, the crown fire potential is much less. As well, the treated stands will be much more open. In fact some stands that average over 100 large trees per acre prior to treatment, will most likely have less than 25 mature trees per acre on moist sites, and less than 10 mature trees per acre on dry sites. When a fire burns through stands with these types of tree stockings, the fire remains as a surface fire. The BTU/sq. ft (heat) is also much less on available firefighters. (Fire & Fuel Management Report, p. 49, project record).

Tactics can include using flappers, combination tools, Pulaskis, or the spraying of water at the heel of the flame to quickly suppress fires in this scenario. This allows a certain level of safety, whereas equipment or aircraft are usually not part of the suppression attack. (Fire & Fuel Management Report, p. 49, project record).

The difficulty, however, comes in the form of rates of spread. More 1 hour type fuels and grass components, which are highly responsive to wind and drying out, carry the fire in a quick fashion when a stand is opened up. The same prescription that helps make a stand resilient to a wildfire during some of the "hottest" conditions, changes the rate of spread greatly. Both the NEXUS and BehavePlus 5.0.5 modeling confirms this by showing rates of spread in Fuel Model 2, the condition after stand treatment, increasing five-fold and moving as much as .3 - .5 miles per hour (ie. 35 chains per hour). (Fire & Fuel Management Report, p. 49, project record).

When it comes to firefighter safety though, there are numerous variables within the weather and topography that are difficult to predict, and that put firefighters at risk, regardless of Alternatives. As stated, the Threemile Project Area is large at over 30,000 acres, with a great variability in fuels and topography. During the early stages of the fire, and during initial attack, firefighters can usually make the most headway for suppression opportunities in treated stands, especially during periods of cooler weather and greater fuel moistures (as discussed on pp. 23, 24 under No Action). (Fire & Fuel Management Report, p. 49, project record).

But, once the fire is large and moving in extreme conditions, firefighter response is often the same in the Ashland area. That is, firefighters get to a grass Fuel Model 1 or Fuel Model 2, supplemented by a road, or equipment line, and hold the fire at those points, mostly by burning out the fuels between the lines and the main fire. Across the whole Threemile landscape, 76 percent of the area would have a more open fuel model with Alternative B, providing that tactic

opportunity to firefighters during extreme conditions. This often provides the most safety and firefighter escape potential. (Fire & Fuel Management Report, p. 49, project record).

Prescribed Fire Maintenance

Although already touched on when discussing the number of prescribed fire treatments and resiliency, initial implementation and effects in the prescribed fire treated stands does not guarantee this condition will continue into the future. Proactive management is required to maintain surface fuels, ladder fuels and canopy base heights to a level that will allow for lower intensity surface fires. This has been a consistent philosophy in literature and for most projects on the District. Therefore, the following management action would be recommended, even after the life of the NEPA decision, because it is so accepted in pine stands:

- Fuel treatments should be considered, evaluated and applied every 1 to 20 years to maintain less stand density, characterized by light surface fuel loading, patchy fuel arrangement, and very little fuel ladder development. Prescribed burning would be used as the primary method of maintenance.

(Fire & Fuel Management Report, pp. 4-50, project record).

It is most likely treatments will not occur before 3-5 years, as often it takes this amount of time to build up enough fine fuel (mostly grasses) after a fire to carry the next fire. The reason treatments could be implemented as often as one year is because prescribed burning on the Ashland Ranger District is often variable. Due to often conservative prescriptions and cooler seasons, to mitigate against escapes to adjacent private lands, prescribed burns can occur without achieving desired effects. It may be that the large dead and down fuels do not consume very well over an entire area due to fuel moistures on variable topographical aspects. And often due to associated livestock grazing, or just areas of low producing grass areas, prescribed fire does not always carry across whole large units. For example, units can range from 200 – 2000 acres. Further, the seasons in which prescribed burning occurs (spring and fall) often have shorter burn windows, and the point of extinction in fine fuels (ie. 15 percent) can occur quite quickly as shading starts to occur with shorter day lengths and higher humidity recovery. (Fire & Fuel Management Report, p. 50, project record).

The intent of the maintenance understory burn treatments is to lessen the amount of larger surface fuels that have accumulated since the last treatment, and ensure mortality of some tree regeneration that has already established as dense pockets. This would ultimately dictate the need and time frame (years) of prescribed burning. (Fire & Fuel Management Report, p. 50, project record).

Conclusions

Alternatives A and B consisting of mechanical and prescribed burn treatments would reduce fuel loadings in forested stands where treated. This would also break up vertical and horizontal contiguous vegetation to create mosaic patterns that alter fire effects and provide for some firefighter safety throughout the area. (Fire & Fuel Management Report, pp. 54-55, project record).

Treated areas, in general, would provide a fuel model with a grass understory that carries the fire spread, giving firefighters more opportunity to implement suppression tactics safely. High intensity torching or crown fires would have more limitation with treatment due to the more open

crowns and the removal of associated ladder fuels after treatment. This would be expected for at least 20 years. (Fire & Fuel Management Report, p. 55, project record).

The level of treatment between Alternatives A and B differs very little, with differences shown in the Yager Gulch area and just north of the Coal Creek Road, where mechanical treatment and prescribed burning would not happen, respectively. Both A and B would treat roughly 4,400 acres out of the 32,924 acre project area, and out of the 12,136 acres of forested acres. This treatment would help get to a desired ecological condition for those treated stands much quicker than the No Action Alternative. (Fire & Fuel Management Report, p. 55, project record).

The Ashland Ranger District encompasses roughly 440,000 acres, and forested stand treatments often occur in less than 4,000 acres annually, mostly through prescribed burning. This is only around one percent of the District. This can be due to a lack of treatment window, budget reasons, personnel availability, or due to other projects being prioritized across the Custer Gallatin National Forest, which reaches from West Yellowstone, Montana, to Camp Crook, South Dakota. This is a distance of over 500 miles for personnel to travel. Due to some of these factors, it is unlikely that fuels treatments will occur on over 6,000 acres per year across the whole Custer Gallatin National Forest. (Fire & Fuel Management Report, p. 55, project record).

Therefore, it is assumed that wildfire will continue to be the primary ecological process that shapes and maintains ecosystems, and will continue to occur throughout the Project Area and the Ashland Ranger District. This is common for all alternatives, specifically after the life of the Threemile project. (Fire & Fuel Management Report, p. 55, project record).

These fires will create effects that are deemed positive or negative to landscapes, depending on the individual resource that is impacted. Again, many wildfires will continue to be suppressed at relatively small acreages to support firefighter safety and adjacent Wildland Urban Interface. However, recent history has shown that many fires will escape initial attack and burn for several operational periods traveling through thousands of acres. In either case, there will be ecological change occurring. The desired condition is for those fires to burn with a range of intensity, frequency, and extent that allows ecosystems to function in a resilient and sustainable manner. (Fire & Fuel Management Report, p. 55, project record).

Further, there will be a continual fluctuation of vegetative transition occurring in both individual stands, and across landscapes, regardless of alternative, when wildfire occurs. In essence, wildfire will continue to occur within its natural range of variability, and will continue to assume its role as an ecological process and natural change agent. (Fire & Fuel Management Report, p. 55, project record).

Wildlife

Resource Indicators and Measures

Project alternative effects will be evaluated by their anticipated impact to management indicator species (MIS) and other species of key interest (i.e. federally threatened and endangered species, regionally sensitive species, selected game species, and state sensitive species) as mandated by the Forest Plan. The list of regionally sensitive species for Custer Gallatin National Forest was verified through the U.S. Forest Service (USFS) website on 31 January, 2018 (USFS 2011). The list of Federally Threatened and Endangered species for Powder River County, Montana, which encompasses the Threemile Project area was verified through the U.S. Fish and Wildlife Service (USFWS) website on 2 February, 2018 (USFWS 2018). The following threatened, endangered,

sensitive, management indicator species and major interest species and/or their habitats are analyzed in detail in the Wildlife Report contained in the Project Record, as well as briefly discussed below:

- Northern long-eared bat.
- Northern goshawk.
- Big game (includes elk, white-tailed deer, and mule deer discussion).
- Bats (includes long-eared myotis, long-legged myotis, and Townsend's big-eared bat discussion).
- Migratory birds (includes loggerhead shrike, golden eagle, merlin, Bullock's oriole, yellow warbler, ovenbird, spotted towhee, and sharp-tailed grouse).

(Wildlife Report, pp. 5-6, project record).

A comprehensive list of threatened, endangered, regionally sensitive, management indicator species and major interest species that were considered by this project is summarized in Table 2. Many of the species were analyzed in the Wildlife Report however species, or their habitats, that do not occur in the project area or surrounding were not evaluated in detail in that report, which is contained in the project record. Habitat descriptions are based on current information located in the Montana Natural Heritage Program, Montana Field Guide (Montana Field Guide 2015). (Wildlife Report, p. 6, project record).

Table 12. Threatened species considered in Threemile analysis that occur in Powder River County, Montana

Common Name Scientific Name	General Habitat Requirements	Present in Project Area	Habitat in Project Area	Description of Effects on Habitat or Species	Determination of Effects1[3]		
					No Action	Alt A	Alt B
Threatened, Endangered and Proposed Species							
Northern Long-Eared Bat *Myotis septentrionalis*	Forest dependent, with availability of snags for summer roosting and deeper recesses for winter hibernacula.	N	Y	See Northern Long-Eared Bat analysis	NE	NLAA	NLAA

[3] The determination of effects for federally listed species (threatened or endangered) is limited to: (1.) NE - No effect; (2) NLAA - May effect - Not likely to adversely affect; (3) * LAA - May effect - Likely to adversely affect; and (4) BE - Beneficial effect. * = Considered a trigger for a significant action. Options in determination of effects for proposed federally listed species are: (1.) No effect; (2.) Not likely to jeopardize the continued existence of the species or result in destruction or adverse modification of proposed critical habitat; (3.) Likely to jeopardize the continued existence of the species or result in destruction or adverse modification of proposed critical habitat. The determination is based on the presence of suitable habitat.

Table 13. Forest service sensitive species considered for analysis in the Threemile project.

Common Name Scientific Name	General Habitat Requirements	Present in Project Area	Habitat in Project Area	Description of Effects on Habitat or Species	Determination of Effects[4]		
					No Action	Alt A	Alt B
Forest Service Sensitive Species							
American Peregrine Falcon *Falco peregrinus anatum*	Cliff habitat over 200' high with suitable ledges for nest construction	N	N	None	NI	NI	NI
Bald Eagle *Haliaeetus leucocephalus*	Riparian habitats, forested areas along major water bodies. May use uplands	Y	Y	Not analyzed in detail; little nesting habitat and few observations in nesting season and no known nests in Threemile area. District is utilized by transient individuals and as winter habitat.	NI	MIIH	MIIH
Black-backed Woodpecker *Picoides arcticus*	Predominately burned areas of pine	Y	Y	Analyzed in Migratory Birds section	NI	MIIH	MIIH
Blue-gray Gnatcatcher *Polioptila caerulea*	Open stands of juniper and limber pine with intermixed sagebrush.	N	N	None. Outside of range.	NI	NI	NI
Burrowing Owl *Athene cunicularia*	Open grasslands, nesting and roosting in burrows on prairie dog colonies	N	Y	Low potential to impact species as prairie dog colonies will not be treated foraging and secondary nesting habitat may be temporarily altered from burning.	NI	MIIH	MIIH
Greater Sage-Grouse *Centrocerus urophasianus*	Sagebrush with intermixed grasslands	N	Y	No leks are found in the project area, nearby leks are inactive. Few impacts to habitat no observations since 2006, not expected to occur.	NI	NI	NI
Harlequin Duck *Histrionicus histrionicus*	Mountain streams	N	N	None	NI	NI	NI
Long Billed Curlew *Numenius americanus*	Mixed grass prairie and moist meadows	Y	Y	Minimal and short term impacts to grasslands. Rare occurrences in project area. Analyzed in Migratory Birds Section	NI	MIIH	MIIH
Black-tailed Prairie Dog *Cynomys ludovicianus*	Flat open grasslands with low vegetation	Y	Y	Prescribed burning is not expected to negatively affect grasslands, impacts would be short term	NI	MIIH	MIIH
Bighorn Sheep *Ovis canadensis*	Cliffs, mountains, rolling foothills	Y	N	Occurrences have been rare and are likely dispersing animals. Not observed since 2001, not expected to occur.	NI	NI	NI

[4] Options in determination of effects: (1) NI - No impact; (2) MIIH - May impact individuals, but is not likely to cause a trend to Federal listing or loss of viability; (3) WIFV – will impact individuals and habitat with a consequence that the action may contribute to federal listing or cause a loss of viability to the population of species; and (4) BI - Beneficial impact. There would be "no impact" to sensitive species determined to be absent from the project area and not included in this table. The determination is based on the presence of suitable habitat.

Gray Wolf *Canis lupus*	Remote mountainous areas, various habitats	N	Y	Occurrences have been rare and are likely dispersing animals. Not observed since 2011 with only 3 observations recorded near the district ever.	NI	NI	NI
North American Wolverine *Gulo gulo luscus*	Remote mountainous areas	N	N	None	NI	NI	NI
Pallid Bat *Antrozous pallidus*	Arid deserts and grasslands with rock outcrops	Y	Y	Analyzed in Bats section.	NI	MIIH	MIIH
Spotted Bat *Euderma maculatum*	Desert to montane coniferous forests	N	N	None	NI	NI	NI
Townsend's Big-eared Bat *Corynorhinus towensendii*	Cave and cave-like structures, forests	Y	Y	Analyzed in Bats section.	NI	MIIH	MIIH
White-tailed Prairie Dog *Cynomys leucurus*	Flat open grasslands with low vegetation	N	N	None	NI	NI	NI
Great Plains Toad *Bufo cognatus*	Sage-brush grasslands, small reservoirs	Y	Y	See Fisheries analysis	NI	MIIH	MIIH
Northern Leopard Frog *Rana pipiens*	Ponds, reservoirs, marshes, and streams	Y	Y	See Fisheries analysis	NI	MIIH	MIIH
Plains Spadefoot *Spea bombifrons*	Soft sandy soils near bodies of water	Y	Y	See Fisheries analysis	NI	MIIH	MIIH
Western Toad *Bufo boreas*	Wetlands, grasslands and forests	N	N	See Fisheries analysis	NI	MIIH	MIIH
Greater Short-horned Lizard *Phrynosoma hernandesi*	Sage-brush and short grass prairie	N	Y	Minimal and short-term impacts to grassland cover and available forage from prescribed burning	NI	MIIH	MIIH
Milk Snake *Lampropeltis triangulum*	Grasslands, burrows, rock outcropping and riparian areas	Y	Y	Minimal impacts to grasslands from prescribed burning. Changes in cover and food source may occur in the short term	NI	MIIH	MIIH
Western Hognose Snake *Heterodon nasicus*	Sagebrush grassland, areas with sandy soil	Y	Y	Minimal impacts to grasslands from prescribed burning. Changes in cover and food source may occur in the short term	NI	MIIH	MIIH

Table 14. Habitat Indicator and Key Species of Interest considered for analysis in the Threemile project.

Common Name Scientific Name	General Habitat Requirements		Present in Project Area	Habitat in Project Area	Description of Effects on Habitat or Species	Determination of Effects[5]		
						No Action	Alt A	Alt B
Habitat Indicator and Key Species of Interest								
Northern Goshawk *Accipiter gentilis*	Indicator for old growth, found in varying forest stands, large wooded tracts		Y	Y	See Northern Goshawk analysis	0	0	0
White-tailed Deer *Odocoilues virginianus*	Indicator for dog hair ponderosa pine, found in woody draws and riparian		Y	Y	See Big Game analysis	0	0	0
Ruffed Grouse *Bonasa umbellus*	Indicator for aspen		N	N	None	0	0	0
Western Kingbird *Tyrannus verticalis*	Indicator for open forest savanna		Y	Y	Treatment of ponderosa pine may improve habitat	0	+	+
Baltimore Oriole *Icterus galbula*	Indicator for riparian trees		Y	N	See Migratory Bird analysis	0	0	0
Yellow Warbler *Setophage petechia*	Indicator for riparian shrub		Y	Y	See Migratory Bird analysis	0	0	0
Ovenbird *Serurus aurocapillus*	Indicator for hardwood draw trees		Y	Y	See Migratory Bird analysis	0	0	0
Spotted Towhee *Pipilo maculatus*	Indicator for hardwood draw shrubs		Y	Y	See Migratory Bird analysis	0	0	0
Brewer's Sparrow *Spizella breweri*	Indicator for sagebrush		Y	Y	See Migratory Bird analysis	0	0	0
Elk *Cercus canadensis*	Protected wooded areas with openings		Y	Y	See Big Game analysis	0	0	0
Sharptail Grouse *Typanuchus phasianellus*	Indicator for prairie grasslands		Y	Y	See Migratory Bird analysis	0	+	+
Merlin *Falco columbarius*	Sparse conifer stands adjacent to prairie		Y	Y	See Migratory Bird analysis	0	+	+
Prairie Falcon *Falco mexicanus*	Cliffs for nesting and grasslands for hunting		N	N	Cliff habitat not available in project area, or nearby not analyzed in detail	0	0	0

[5] Options in determination of effects: (1) + = positive impact; (2) 0 = neutral or no impact; and (3) - = negative impact.

Mule Deer *Odocoileus hemionus*	Ponderosa pine forest, juniper stands, sage brush and grasslands		Y	Y	See Big Game analysis	0	+	+
Pronghorn Antelope *Antilocapra americana*	Grasslands and sagebrush		Y	Y	See Big Game analysis	0	+	+
Greater Prairie Chicken *Tympanuchus cupido*	Grasslands		N	N	None	0	0	0

Table 15. Migratory birds that were considered for analysis in the Threemile project.

Common Name Scientific Name	General Habitat Requirements	Present in Project Area [6]	Habitat in Project Area	Description of Effects on Habitat or Species	Determination of Effects[7]		
					No Action	Alt A	Alt B
Migratory Birds and Birds of Conservation Concern							
Black-billed Cuckoo *Coccyzus erythropthalmus*	Wooded draws, forest edges and thickets	N	Y	Does not occur on Ashland Ranger District	0	0	0
Brown Creeper *Certhia americana*	Mature and old growth stands with high canopy cover, snags	P	Y	See Migratory Bird analysis	0	-	-
Cassin's Finch *Haemorhous cassinii*	Ponderosa pine, post-fire forests	Y	Y	See Migratory Bird analysis	0	-	-
Chestnut-collared Longspur *Calcarius ornatus*	Short to medium grasses, grazed areas	P	Y	See Migratory Bird analysis	0	+	+
Clark's Nutcracker *Nucifraga columbiana*	Ponderosa pine stands	P	Y	See Migratory Bird analysis	0	-	-
Ferrginous Hawk *Buteo regalis*	Mixed grass prairie, shrub lands, grasslands	N	Y	Infrequent and transient, not analyzed in detail	0	0	0
Golden Eagle *Aquila chrysaetos*	Hilly to mountainous areas, cliff and large trees for nesting	Y	Y	See Migratory Bird analysis	0	0	0
Great Blue Heron *Ardea herodias*	Wetlands, rivers and lakes with large trees for nesting	N	Y	No impacts to wetlands or reservoirs expected, not analyzed in detail	0	0	0
Green-tailed Towhee *Pipilo chlorurus*	Shrub communities	Y	Y	Potential increase in shrubs from harvest of encroaching ponderosa pine. See Migratory Bird analysis	0	+	+
Lark Bunting *Calamospiza melanocorys*	Short and mixed grass communities	Y	Y	See Migratory Bird analysis	0	+	+
Loggerhead Shrike *Lanius ludovicianus*	Open landscapes with short vegetation, pastures, and riparian	Y	Y	See Migratory Bird analysis	0	+	+
Long-eared Owl *Asio otus*	Hedgerows, woody draws, juniper thickets and the forest edge	Y	Y	See Migratory Bird analysis	0	+	+
Pinyon Jay *Gymnorhinus cyanocephalus*	Ponderosa pine woodlands	P	Y	See Migratory Bird analysis	0	0	0
Red-headed Woodpecker *Melanerpes erythrocephalus*	Riparian forest, open savanna, and snags	Y	Y	See Migratory Bird analysis	0	0	0
Sage Thrasher *Oreoscoptes montanus*	Big sagebrush	P	Y	See Migratory Bird analysis	0	+	+
Veery	Dense riparian deciduous forests	Y	Y	See Migratory Bird analysis	0	0	0

[6] Y- Observed in project area, P- Potentially present; no recorded observations in project area but present nearby or on the District, N- Not present

[7] Options in determination of effects: (1) + = positive impact; (2) 0 = neutral or no impact; and (3) - = negative impact.

Catharus fuscescens							

Table 16. Montana Species of Concern considered for Threemile project analysis that were not included in other sections.

Common Name Scientific Name	General Habitat Requirements	Present in Project Area [8]	Habitat in Project Area	Description of Effects on Habitat or Species	Determination of Effects[9]		
					No Action	Alt A	Alt B
Montana Species of Concern							
Fringed Myotis *Myotis thysanodes*	Sagebrush grassland, woodland habitats, rock crevices	P	Y	See Bat analysis	0	0	0
Hoary Bat *Lasiurus cereus*	Forested areas, riparian corridors	Y	Y	See Bat analysis	0	0	0
Little Brown Myotis *Myotis lucifugus*	Forested areas with snags, caves and mines	Y	Y	See Bat analysis	0	0	0
Merriam's Shrew *Sorex merriami*	Sage brush, grasslands	P	Y	Minimal effects on grasslands and sagebrush	0	0	0
Snapping Turtle *Chelydra serpentina*	Rivers, reservoirs, streams	P	Y	No impacts to waterways or reservoirs	0	0	0
Spiny Softshell *Apalone spinifera*	Large rivers, lakes and ponds	N	N	None	0	0	0

[8] Y- Observed in project area, P- Potentially present; no recorded observations in project area but present nearby or on the District, N- Not present
[9] Options in determination of effects: (1) + = positive impact; (2) 0 = neutral or no impact; and (3) - = negative impact.

(See Tables 2-6 in the Wildlife Report, pp. 7-13, project record).

Effects Analysis

Proposed changes in vegetation characteristics including: cover, structure, spatial distribution, and interspersion, may affect wildlife species use in the Threemile Project area. Effects of the proposed action and alternatives are discussed separately in this report for each species and/or their habitat as identified in Table 12 above and Table 2 in the Wildlife Report, project record. Predicted effects on wildlife habitat by proposed treatments were evaluated using Geographic Information System (GIS) tools in the program ArcMap 10.2 (ESRI 2011). These tools were used to estimate current, post-treatment, and future conditions. (Wildlife Report, p. 14, project record).

Data for vegetation and wildlife habitat effects analysis was primarily based on geodatabase information stored in R1-VMap (Barber and Vanderzanden 2009). This geodatabase is used to produce four primary map products; lifeform, tree canopy cover class, tree diameter, and tree dominance type. Non-forest map classes (e.g., grassland and shrubland vegetation communities) are also included for the Sioux and Ashland Ranger Districts of the Custer Gallatin National Forest. This geodatabase is used to produce products to meet information needs at various levels of analysis per the USFS National and Regional direction established by the Existing Vegetation Classification and Mapping Technical Guide (Brohman and Bryant 2005) and the Region 1 Multi-level Classification, Mapping, Inventory, and Analysis System (Berglund et al. 2009). Accuracy assessment of R1-VMap vegetation information was completed in February 2010 (Vanderzanden et al. 2010). For the Custer National Forest, overall vegetation dominance accuracy was 74%; tree size class and tree canopy class were 72% and 63% accurate, respectively. (Wildlife Report, p. 14, project record).

Spatial and Temporal Bounds

The Threemile project area boundary (34,540 acres) was used for the primary assessment of direct and indirect effects to wildlife for this report but may have been expanded to the boundary of the Ashland Ranger District (436,000 acres) for some species. The project is large enough to address real and potential direct and indirect effects to populations and habitats evaluated by this report. Cumulative effects were assessed for the project area and the Ashland Ranger District as a whole. (Wildlife Report, p. 14, project record).

Wildlife effects analysis considers a short term (0-10 year) and a long term (10 to 60 year) time scale. The short term time scale represents disturbance to the landscape during project activities and impacts before natural regeneration. The long term scale describes how the effects of the proposed treatments may impact habitats as regeneration occurs. (Wildlife Report, p. 14, project record).

Northern Long-eared Bat

Alternative A includes both commercial timber management and prescribed burning. During commercial harvest, large ponderosa pines that could act as roost trees may be removed, reducing available roosting habitat. Snags that are found within the harvest units would likely be retained but may be felled by harvesting equipment or if they pose a safety hazard. Similarly the reduction of contiguous forested stands and forest structure may impact the availability of foraging habitat. Noise from harvest activities and prescribed burning may temporarily displace

bats from roosting or hibernacula if winter activities occur. As treated stands age, the non-harvested ponderosa pine would eventually provide for snags on the landscape. However there may be a reduction in large ponderosa pine that may also act as roosting habitat but this may be provided for in surrounding un-treated stands. Given mitigation measures listed below, that the project area is not currently impacted by white-nose syndrome, and individuals are not known to occur on the district the project activity is not likely to adversely affect populations of the northern long-eared bat. (Wildlife Report, p. 21, project record).

Effects to northern long-eared bats would be similar in alternative B due to similar acreages of commercial harvest with fewer effects from prescribed burning. Given the Design Criteria Common to the Action Alternatives described above, that the project area is not impacted by white-nose syndrome, on the western edge of the species range, and no individuals are not known to occur on the district the project activity is not likely to adversely affect populations of the northern long-eared bat. (Wildlife Report, p. 21, project record).

Consultation with the US Fish and Wildlife Service is ongoing and project work is dependent on a concurrence of a not likely to adversely affect determination. (Wildlife Report, p. 22, project record).

The no action alternative will have no impacts on bats in the short term when implementation would occur. Under this alternative no roosting bats, maternity colonies, or hibernacula would be displaced by project activities allowing any northern long-eared bats that may be present to continue utilize current roosts. Snag recruitment would continue to occur through natural processes, providing for a low number of snags throughout the landscape. Foraging habitat would similarly remain unchanged providing for forest habitat across the project area. In the long term, fires will continue to occur within the project area. If fires continue to burn at the intensity and frequency observed within the Threemile project area they would provide for reduced understory to allow for foraging and create snags for roosting habitat. However, if a large scale fire occurs across the project area, bats would likely be displaced as foraging habitat would be reduced. While an abundance of snags for roosting would be created in the short term, few green trees would be remaining, reducing future sang recruitment. Any existing hibernacula would likely not be impacted. (Wildlife Report, p 21, project record).

Northern Goshawk

Alternative A would result in the reduction of nesting, PFA, and foraging habitat and create a potential for disturbance during the nesting season. In this alternative, 2,312 acres of nesting habitat would be treated resulting in 1,035 acres of remaining habitat. Based on recommendations to maintain 240 acres per 5000 acre home range, the nesting habitat exceeds the recommendation for the size of the timbered area south of Threemile Creek. Within the 420 acre PFA, 79 acres would be commercially treated, 6 would be commercially treated and prescribed burned, and 66 acres of non-forested land would be prescribed burned totaling 151 acres of treatment. 29% of timbered stands within the PFA will be commercially treated reducing canopy cover and likely the availability of forested prey species (Table 7 in the Wildlife Report, project record). Long-term, as these stands regenerate, they may contribute to the mosaic within the PFA and foraging area that would continue to supply a prey base. If timing restrictions and activity buffers are followed, disturbance to the goshawks should be low. (Wildlife Report, p. 26, project record).

Alternative B would have similar effects on nesting, PFA, and foraging habitat as Alternative A and would also create a potential for disturbance during the nesting season. In this alternative, 2,143 acres of nesting habitat would be treated resulting in 1,204 acres of remaining habitat. Based on recommendations to maintain 240 acres per 5000 acre home range, the nesting habitat exceeds the recommendation for the 4 home ranges in the timbered area south of Threemile Creek. Within the 420 acre PFA, 111 acres would be commercially treated, 6 would be commercially treated and prescribed burned, and 64 acres of non-forested land would be prescribed burned totaling 181 acres of treatment. 39% of timbered stands within the PFA will be commercially treated, reducing canopy cover and likely the availability of forested prey species (Table 17, below). The increased use within the PFA and foraging areas may reduce the utility of the PFA compared to alternative A. With implementation of timing restrictions and activity buffers, potential disturbance to nesting goshawks should be low. (Wildlife Report, pp. 26-27, Table 7, project record).

Table 17. PFA components for the known goshawk nest stand, each action alternative and No Action.

Habitat Component	Nest Stand PFA	Alternative A	Alternative B	No Action
	Acres	% Acres Treated		
Tree 0.0-4.9”	0	0	0	0
Tree 5.0-9.9	0	0	0	0
Tree 10.0-+	290	29	39	0
Shrub, forb, grass	126	52	51	0

Under the no action alternative, nesting, PFA, and foraging habitat within the project area will remain the same with no additional disturbance in the short term. Into the future, wildfire will continue to occur within the project area. Low intensity and small scale fires will continue to perpetuate the mosaic of habitats needed to support goshawks by creating openings, young stands, and regenerating habitat. In the event of a large scale fire, goshawk habitat would likely be reduced and could displace the current known nesting pair. (Wildlife Report, pp. 25 of 36).

Conclusion

At the project level, both alternative A and B will reduce nesting within the project area. The Custer Gallatin and other forests in the Region still individually meet or exceed the threshold to maintain a viable regional population (Brewer et al. 2009). Project actions may affect the individuals nesting within the project area but would not have impacts to the overall population. To reduce disturbance effects, a 40 acre, year-round, no disturbance buffer will be placed around any existing nests and newly discovered nests. The nest buffer around the known nest is skewed to the east to include water features that have evidence of and observations of use by goshawks while utilizing the presence of ridges and draws to reduce disturbance. Additionally, the 420 acre PFA, centered on the nest will act as a no disturbance buffer from April 15 to August 15 to reduce disturbance until 30 days post fledging. Between action alternatives, treatment units in Alternative B are larger and more connected than in Alternative A, reducing the mosaic of habitat throughout the project area and within the PFA. Impacts to the PFA are larger in Alternative B

and therefore may reduce the utility of the area, having greater impacts to the known nest. (Wildlife Report, p. 27, project record).

Big Game

Alternatives A and B

Under Alternative A, security and habitat effectiveness will be reduced in the short term, cover will be reduced for 10-40 years until trees can regenerate. Forage values will be increased until cover returns. Security would be reduced below recommended levels within the project area, reducing the ability of the area to retain big game during the hunting season while project work continues. Depending on the effectiveness of road closures, motor vehicle trespass will likely occur during the big game season (USFS, 2013). However, in the long term, security will increase with the decommissioning of 2.1 miles of road. Habitat effectiveness will similarly be reduced by the increase in road quantity and the use of administrative routes during project work (See Additional Figures). Habitat effectiveness should increase after project work is completed with the decommissioning of 2.1 miles of road within the project area. Cover will be reduced within the project area to about 27%, falling below recommendations but remaining consistent with what is seen across the district. Throughout the district, cover will only be reduced by 0.6% allowing big game can seek cover outside the project area. Cover will return once trees have regenerated and grown to 4.5 feet in 10-40 years. Prescribed burning will remove junipers from treated stands but these trees are not expected to be impacted by harvest treatments. Forage will increase with commercial thinning and burning activities, benefiting big game in the short term. Forage will likely return to current levels after trees have regenerated in 10-20 years. Wildlife Report, pp. 32-34, project record)

Project activities occur mostly within timbered stands with only 1,508- 1,971 non-timbered acres treated with prescribed burning. These burns will increase forbs and increase the quality of forage available. Therefore, project activities are expected to have a slight positive impact on pronghorn within the project area. Wildlife Report, p. 36, project record)

Alternative B offers similar effects to habitat effectiveness and forage as alternative A. Alternative B offers better security retention during project activities due to the distribution of secure habitat across the project area and the increase to overall security will also be seen. Effects to quantity of cover will be comparable between units however, the expanded size of individual units reduces the amount of green tree cover between units. This could reduce the movement of game across the project area and between areas of high cover or security by reducing the utility of small scale corridors. However, additional junipers may be retained by the reduced acres of prescribed burning. Wildlife Report, p. 36, project record).

In order to mitigate for reductions in security, habitat effectiveness, and cover it is recommended to retain at least 75 feet of hiding cover along open travel plan roads. As demonstrated below.

Figure 5. Visibility of an elk decoy 75 feet from the road in unit 183.
(Wildlife Report, p. 33, project record).

This mitigation is expected to reduce impacts to game from road use by reducing visibility of game to hunters and reducing sound impacts from vehicle traffic increasing the amount of habitat that can be used without disturbance (Montgomery et. Al, 2013). While 75' my not provide screening cover in all areas, visual and picture surveys indicate that in many instances it will adequately screen an elk. (Wildlife Report, p. 33, project record).

Under the No Action alternative, security, habitat effectiveness, cover and forage will remain unchanged. Fire regimes will remain the same, altering the landscape within the natural range of variation. Big game populations would likely continue to follow current increasing population trends and continue to provide recreation opportunity for hunters across the district. Wildlife Report, p. 32, project record)

Conclusion

Negative effects to big game security and habitat effectiveness are likely limited to the duration of project activities with positive effects seen after completion. However, this is only true if roads can be effectively closed after project completion. During project work, big game may be more frequently disturbed and displaced. Cover is available throughout the district and can provide for big game until cover is replaced in 10-40 years. Overall negative impacts on big game will be short term. (Wildlife Report, p. 34).

Bats

The pallid bat, Townsend's big-eared bat, and spotted bat are all identified as Region One sensitive species in Montana on the Custer National Forest units. The hoary bat, fringed myotis, and little brown myotis are Montana state species of concern. (Wildlife Report, p. 33, project record).

Effects from action alternatives A and B to timbered stands are similar to what was described in the northern long-eared bat analysis. Prescribed burning may additionally impact sensitive bat species by temporarily displacing bats and altering their foraging habitat. These effects are expected to be temporary and to last only until grasses and sagebrush return, likely within weeks. If mitigation measures described in the northern long-eared bat analysis are followed, these actions may impact individual bats but are not expected to contribute to a loss of viability of the populations. (Wildlife Report, p. 34, project record).

Under the no action alternative there will be no impacts to sensitive bat habitat for roosting or foraging. Timbered roosts and foraging habitat will remain unchanged unless unpredictable fire events displace bats. No noise disturbance would disturb bats roosting in rock crevices and prescribed burning will not temporarily displace grassland bats. (Wildlife Report, p. 34, project record).

Migratory Birds

Migratory birds are a very diverse group, which includes raptors, waterfowl, shore birds, upland game birds and songbirds. Migratory bird species are protected under the Migratory Bird Treaty Act (MBTA). Executive Order 13186 requires agencies to ensure that environmental analyses evaluate the effects of federal actions and agency plans on migratory birds, with emphasis on species of concern. The Montana Natural Heritage Program (MNHP) Environmental Summary Report (Montana Natural Heritage Program 2017), 2008 Birds of Conservation Concern (BCC) report (US Fish and Wildlife Service 2008), and the online iPaC Resource (US Fish and Wildlife Service) were used to identify focal species for this project. Species were also selected from the Region 1 list of sensitive species and the Forest Plan Habitat Indicatory and Key species lists (USDA 1986, p. 18). The MNHP serves as the state's information source for animals, plants, and plant communities with a focus on species and communities that are rare, threatened, and/or have declining trends and as a result are at risk or potentially at risk of extirpation in Montana. Montana Animal Species of Concern (MTSOC) are native Montana animals that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution. The iPaC resource was used to identify which BCC are potentially present in the project area. (Wildlife Report, pp. 34-35, project record).

Migratory bird species of concern considered for this project include those that have been documented in the vicinity of the project area and for which the project area contains suitable habitat. A number of species on these lists would not be affected by the proposed activities because appropriate habitat is not present in proposed treatment locations; these species will not be considered further. Northern Goshawk have been previously addressed and are not included in this analysis. Migratory birds included in this analysis are listed below. (Wildlife Report, p. 35, project record).

Table 18. Species as categorized as Forest Service Sensitive, or Habitat Indicator Species or Birds of Conservation Concern.

Forest Service Sensitive	Habitat Indicator Species	Birds of Conservation Concern
Black-backed Woodpecker	Baltimore Oriole	Black-billed cuckoo
Long billed Curlew	Yellow Warbler	Brown Creeper
	Oven Bird	Cassin's Finch
	Spotted Towhee	Chestnut-collared Longspur
	Brewer's Sparrow	Clark's Nutcracker
	Sharptail Grouse	Golden Eagle
	Merlin	Lark Bunting
		Loggerhead Shrike
		Long-eared Owl
		Pinyon Jay
		Sage Thrasher
		Veery

Conclusion

For all treatments, the habitat of individual birds, breeding pairs, or family groups might be affected, but these effects (positive or negative) would be too minor (due to the size and distribution of affected areas) to have impacts to any species at the population level. Stands in the immediate vicinity of treatment units would provide habitat for species selecting for dense canopies. Treatment activities would promote a mosaic of structural stages and stand compositions in affected areas following treatment. Project design criteria would be implemented that would potentially reduce impacts by altering the season of the proposed activities (winter harvest versus summer implementation for a portion of the area), protecting known, long term breeding sites for key species. (Wildlife Report, p. 36, project record). Also, see Design Criteria Common to the Action Alternatives, above.

Water

Environmental Consequences Common to Both Action Alternatives

Changes to Surface Water Quantity

Water Yield

Review of data sources (Troendle et al. 2010; Bosch and Hewlett, 1982, and MacDonald and Stednick, 2003; Omang and Parrett, 1984, Meredith and Kuzara, 2014), and anecdotal evidence suggest that there is a low likelihood for average annual water yield change to result from forest cover removal. Even if a minor change in water yield was to be realized within or adjacent to the project area, this change would be considered beneficial. For these reasons, further analysis of water yield for either of the action alternatives has not been conducted. (Water Resources Report, pp. 18-19, project record).

Peak Flows

In light of the prevalence of other controlling factors (i.e. storm pattern) on peak flows and watershed response to forest cover change outlined under *Water Yield* above and in *Peak Flows* under Existing Condition detailed in the Water Resource Report at pp. 13-14, peak flow analysis has been omitted from further analysis. (Water Resources Report, pp. 18-19, project record).

Alternative A – Proposed Action

Direct and Indirect Effects

Changes to Surface Water Quality

Estimates of sediment yield are predicated upon timing of proposed project activities. For a variety of reasons, exact timing of project work cannot be established during analysis. These reasons include but are not necessarily limited to the following:

1. Timber harvest, while bound by contracting to occur within a specified timeframe, would be subject to weather and site conditions, operator availability and skill, and coordination with other ongoing management activities within the Threemile project area (for example, range management).
2. Prescribed burning is a stand-alone fuels management treatment that may occur independent of any mechanical fuels treatment or in coordination with mechanical fuels treatment. Where applicable, prescribed burning would occur after timber harvest and as such would be subject to the harvest implementation schedule. Though harvest scheduling, being bound by contract, is completed in a sequential manner within a specified time frame, the specifics of the locations where work would be completed have yet to be fully fleshed out at the time of analysis. Given the uncertainty of timber harvest timing within each catchment, prescribed burning implementation timing will also inherit some further uncertainty.
3. Weather windows conducive to prescribed burning may not occur in a given year or may not correlate with personnel availability.

(Water Resources Report, p. 19, project record).

Despite this uncertainty, several assumptions can be made with respect to activity timing to bound this analysis:

1. Implementation of certain activities will be subject to FS regeneration policy, which stipulates that stands must be fully restocked within five years of harvest activity implementation (see Vegetation Report for further discussion). Prescribed burning must be implemented so as to avoid excessive seedling mortality.
2. Temporary roads would be built in advance of project implementation.
3. Timber harvest will likely be accomplished within a three year window of time (CGNF timber program personal communication 2018).
4. As noted above, prescribed burning in timber sale units would occur following timber harvest.

(Water Resources Report, pp. 19-20, project record).

With the scope and complexity of proposed Threemile project activities, it was not feasible to phase project activities for sediment modeling purposes; modeling was completed under the premise that all activities propose in a given 6^{th} HUC or subcatchment would occur

simultaneously, thereby representing a worst case scenario. In reality, project activities would be staggered across at least three to five years. (Water Resources Report, p 20, project record).

Hillslopes proposed for treatment were modeled using Disturbed WEPP. Both 10-year (10% probability) and 5-year recurrence interval (20% probability) annual precipitation scenarios were evaluated. Model outputs are best interpreted as change in sediment delivery directly associated with project activities assuming sediment yield remains roughly static across untreated portions of 6th HUCs and subcatchments in the project area. So, only in subcatchments where project activities are proposed on virtually every acre are model outputs representative of subcatchment-scale sediment yield. Where this is not the case, outputs are best interpreted as what would occur during snowmelt-related runoff and if multiple short-duration thunderstorms were to affect all units in a given 6th HUC or subcatchment simultaneously in the course of a year. Low intensity long-duration rainfall events (greater than 24 hours) are rare in southeast Montana. Thunderstorms across southeast Montana commonly are five square miles or less in area (T. Frieders, National Weather Service Incident Coordination Meteorologist, personal communication), so this assumption is reasonable given that most units occur in clusters within the project area. (Water Resources Report, p. 20, project record).

Hillslope-related sediment production for Alternative A may result in virtually no change in sediment yield in Home Creek as a result of the limited extent of proposed project activities (Table 19, below). (Water Resources Report, p. 20, project record).

Model outputs for Otter Creek-Newell Creek suggest that project activities may result in a decrease in 5-year and 10-year recurrence interval (RI) sediment yield. This is likely a result of increased logging slash on the forest floor associated with commercial harvest activities, thereby resulting in increased roughness and associated deposition. (Water Resources Report, p. 20, project record).

Table 19: Modeled hillslope-related sediment delivery by 6th HUC. Included are Alternative A and a no treatment scenario in tons/yr under 10-yr (10% probability) annual precipitation and 5-yr (20% probability) annual precipitation.

	Alternative A		No Treatment	
6HUC Name	**Modeled 10% probability sediment delivery (tons/yr)**	**Modeled 20% sediment delivery (tons/yr)**	**Modeled 10% probability sediment delivery (tons/yr)**	**Modeled 20% sediment delivery (tons/yr)**
Home Creek	0.00	0.00	0.05	0.00
Otter Creek-Newell Creek	0.07	0.04	0.41	0.20
Tenmile Creek	9.58	3.50	7.87	4.16
Threemile Creek	37.80	5.43	19.29	10.23

(See also Table 6 in the Water Resources Report, p. 20, project record).

At the 5-year RI, model outputs suggest that Tenmile Creek may experience a decrease in total project-related sediment yield from unit hillslopes. As with Otter Creek-Newell Creek, this decrease is likely a result of increases in understory logging debris. At the 10-year RI, hillslope units in Tenmile Creek may experience an increase in sediment yield, likely as a result of infiltration exceedance in some units throughout the project area. A modest uptick in sediment yield from project-area hillslope units may occur at this, and potentially higher, RIs- on the order of 20%. With only a 10% probability of occurrence of such an event happening in any given year, it is unlikely that such an uptick in sediment yield would be realized during project implementation. (Water Resources Report, p. 21, project record).

Similar to Tenmile Creek, model outputs suggest that the Threemile Creek 6th HUC may see a decrease in 5-year RI sediment yield from an untreated condition by as much as 47%. Sediment yield could nearly double, however, from untreated condition under a 10-year (and likely greater) RI precipitation scenario. Of note is that the majority of this sediment appears to be generated due to infiltration exceedance across Unit 914, which has been proposed for prescribed burning. From all units other than Unit 914, sediment may increase by approximately 12% under the 10-year RI event. As noted in Design Criteria 9, burning of Unit 914 would be completed in phases to minimize the risk of sediment conveyance to the North Fork of Threemile Creek should one or multiple high intensity thunderstorm events occur immediately following implementation. Also of note is that fact that sediment delivery across the road encircling Unit 914 is rather unlikely. (Water Resources Report, p. 21, project record).

With respect to subcatchments, model outputs suggest that sediment yield may increase in Coal Creek by as much as 26% under the 5-year RI annual precipitation scenario (Table 20, below).

All other subcatchments are anticipated to maintain sediment yields similar to those occurring under the no treatment scenario (Softwater Spring Draw and Spike Camp Spring Draw) or experience a reduction in sediment yield (Nutter Draw, Shorty Creek, Watt Draw, and Yager Gulch) under the 5-year RI annual precipitation scenario. Under the 10-year RI annual precipitation scenario, sediment yield may increase in Coal Creek, Nutter Draw, and Softwater Spring Draw immediately post-implementation. Watt Draw and Spike Camp Spring Draw are likely to have roughly the same sediment yield under both Alternative A and the no treatment scenario under the 10-year RI annual precipitation scenario. Yager Gulch is anticipated to see a reduction in sediment yield under Alternative A, likely due to increased logging slash in the understory. (Water Resources Report, p. 21, project record).

Table 20: Modeled hillslope-related sediment delivery by subcatchment. Included are Alternative A and a no treatment scenario in tons/yr. under 10-yr (10% probability) annual precipitation and 5-yr (20% probability) annual precipitation.

	Alternative A		No Treatment	
Subcatchment Name	**Estimated 10 year RI sediment delivery (tons/yr)**	**Estimated 5 year RI sediment delivery (tons/yr)**	**Estimated 10 year RI sediment delivery (tons/yr)**	**Estimated 5 year RI sediment delivery (tons/yr)**
Coal Creek	6.58	2.48	3.72	1.97
Nutter Draw	6.90	2.06	5.28	2.93
Shorty Creek	3.39	0.66	3.83	2.02
Softwater Spring Draw	3.06	0.92	1.70	0.90
Spike Camp Spring Draw	1.37	0.36	1.24	0.57
Watt Draw	0.97	0.25	1.46	0.84
Yager Gulch	0.01	0.00	1.34	0.83

(See also Table 7 in the Water Resources Report, pp. 21-22, project record).

In HUCs and sub-catchments where hillslope sediment yield is anticipated to increase following implementation, particularly under more high intensity rainfall, risk of exacerbated sediment yield would abate to no treatment levels with 1-2 years post implementation as rangeland and understory vegetation recovers from prescribed burning and harvest-affected soils revegetate either naturally or via restoration activities. (Water Resources Report, p. 22, project record).

As noted under Existing Condition, a small percentage of the road system contributes sediment to watercourses through the project area. A total of 28.3 miles of temporary roads would be constructed under Alternative A. Of those, approximately 20 miles would fall within 300 feet of

a watercourse (which may have ephemeral, intermittent, or perennial flow) on slopes greater than 15 percent. (Water Resources Report, p. 22, project record).

Assuming a typical scenario where standard BMPs are maintained throughout log haul (outsloped road profile, slopes generally 6% or less, native surface road), WEPP: Road erosion modeling suggests that sediment yield would likely be limited to just over one ton per year total across all 20 miles in these high risk areas regardless of soil type where buffer length is between 100 and 300 feet from intermittent or perennial streams. Estimates of sediment delivery across project area 6th HUCs and subcatchments can be found in Table 21 below, and Table 8 of the Water Resources Report, p. 22, project record.

Taken together, these data suggest that project-related sediment yield under Alternative A may decrease below current levels across some project units and infrastructure, remain roughly similar in other instances, or modestly increase for a short duration in a few instances if high intensity rainfall events were to occur during project operations. Much of the watercourse mileage in the project area is intermittent. Given the spatial and temporal variability in flow expression in these channels, sediment delivery may not translate to water quality impairment that can be differentiated from natural water quality; sediment may be delivered to the base of a dry draw and transported downstream during a large, flashy, thunderstorm-driven runoff event, which would mobilize total sediment amounts well in excess of that supplied by project activities. (Water Resources Report, p. 22, project record).

Table 21: Estimated average annual sediment delivery for temporary roads that may fall within 300 feet of a perennial or intermittent under Alternative A broken down by 6th HUC (Top) and subcatchment (Bottom).

6th HUC Name	Alt A High Risk Mileage	Alt A Estimated average annual sediment delivery (tons/yr)
Home Creek	0.0	0.0
Otter Creek-Newell Creek	0.5	0.0
Tenmile Creek	8.4	0.6
Threemile Creek	11.3	0.7

Table 21 continued.

6th HUC Name	Alt A High Risk Mileage	Alt A Estimated average annual sediment delivery (tons/yr)
Coal Creek	1.9	0.1
Nutter Draw	4.3	0.3
Shorty Creek	2.4	0.2
Softwater Spring Draw	0.2	0.0
Spike Camp Spring Draw	0.6	0.0
Watt Draw	2.6	0.2
Yager Gulch	4.6	0.3

(See also Table 8 Water Resources Report, p. 22, project record)

Changes to Watercourse Condition

Sediment delivery would be limited under Alternative A if not reduced below current levels. Riparian vegetation would not be lit during prescribed burning implementation, minimizing the potential for riparian vegetation mortality and subsequent destabilization. (Water Resources Report, p. 23, project record).

Stream channels throughout the project area are naturally predisposed to moderate to high sensitivity to disturbance as a result of mostly smaller grain sizes (generally gravel-sized or smaller) comprising the beds and banks. Reach stability is highly contingent on intact bank vegetation. Flashy yet robust runoff responses from periodic large runoff events that typify flow regimes through this area exacerbate these channels' propensity to instability. (Water Resources Report, p. 23, project record).

With no increase in peak flow expected, a low potential for change in water yield to be realized, and sediment yield increases (where possible) expected to be short-lived and in line with production that would occur under natural processes in this landscape, it is unlikely that project work would contribute to channel destabilization beyond that which would be realized under natural ranges of variability. Further supporting this conclusion is Leopold and Miller's sediment rating curve (Figure 10, Leopold and Miller 1956) discussed under existing condition. Estimates of peak flows using regression curves for the Southeast Plains region of Montana (Parrett and Johnson 2004, via StreamStats) for those primary subcatchments in the Threemile project area suggest that a two-year recurrence interval event may generate on the order of 5-10 cfs of runoff for catchments of the size range represented within the project area. Under such an event, two orders of magnitude more sediment than the estimated average annual sediment yield generated from project activities would be readily entrained and transported. With such high sediment transport capacities, it is highly unlikely that project-generated sediment would exacerbate channel avulsion potential or bank scour. (Water Resources Report, p. 23, project record).

The crossing proposed for installation on Coal Creek would be installed so as to accommodate at least a 25 year runoff event (per Logan 2001). This crossing would be removed following completion of the project and the installation site would be reclaimed. No long term adverse effects are anticipated from crossing installation or removal. (Water Resources Report, p. 23, project record).

Changes to Riparian Areas, Wetlands, Floodplains, and Springs

Riparian areas and wetlands would be buffered and avoided in stands where mechanical treatment would occur. Other than at temporary crossings, machinery would not operate in riparian areas or wetlands. Through implementation of temporary crossing design criteria, impacts on riparian areas and floodplains would be minimized in extent and duration. Mechanical operations would not occur on any floodplains adjacent to perennial streams. (Water Resources Report, p. 23, project record).

Under the record of success in BMP and SMZ implementation and effectiveness discussed under Analysis Methods, the chance of long-term detrimental impacts to wetlands, riparian areas, and floodplains through project implementation is minimal. Custer Gallatin National Forest watershed personnel would work with project fuels specialists and sale administrators to avoid and/or minimize impacts as well as to monitor these resources during project implementation. (Water Resources Report, pp. 23-24, project record).

Acreage of riparian vegetation that would be intersected by prescribed burning activities can be found in Table 22 below. Project activities would only intersect riparian areas in the Tenmile Creek and Threemile Creek 6th HUCs. Limited areas of Riparian-Graminoid and Riparian-Shrub ecotypes fall within prescribed burn boundaries; the majority of affected riparian area is Riparian-Green Ash Woodland acreage that falls within the boundaries of Unit 914. Per Design Criteria 8, riparian vegetation would not be directly ignited during implementation of project activities, thereby minimizing the potential for deciduous woody vegetation mortality. (Water Resources Report, p. 24, project record).

Table 22: Acres of riparian area intersected by treatments proposed under Alternative A.

Alternative A	6th HUC Name		
Riparian/Woody Draw Local Classification and Proposed Treatment	**Tenmile Creek**	**Threemile Creek**	**Grand Total**
Riparian-Graminoid		***0.1***	***0.1***
Broadcast Burning for Non-Forest Restoration		0.1	0.1
Riparian-Green Ash Woodland	***2.1***	***10.6***	***12.6***
Broadcast Burning		10.4	10.4
Broadcast Burning for Non-Forest Restoration	2.1	0.1	2.2
Riparian-Shrub		***0.6***	***0.6***
Broadcast Burning		0.6	0.6
Grand Total	**2.1**	**11.3**	**13.4**

(See also Table 9 in the Water Resources Report, p. 24, project record)

Through implementation of design criteria, no adverse effects are anticipated to the small, disjunct floodplains in project area. Further, no further impacts to springs result from implementation of Alternative A. (Water Resources Report, p. 24, project record).

Conclusion

Under Alternative A, no measurable change in water quantity is anticipated. Sediment is the only pollutant that may be conveyed to draw bottoms and/or stream channels. Potential effects are variable across sub-watersheds and sub-catchments, with no change in sediment delivery in Home Creek, a possible reduction in sediment delivery in Otter Creek-Newell Creek, and a potential reduction in sediment delivery under low intensity rainfall events and increase in sediment delivery under higher intensity rainfall events in Threemile and Tenmile Creek. Any potential increase in sediment production would be short-lived. Road-related sediment delivery from temporary roads is anticipated to be approximately one ton per year total across the entire project area. (Water Resources Report, p. 24, project record).

There is low potential for watercourse condition compromise as a result of the limited short-term sediment conveyance potential from project implementation. A low percentage of riparian vegetation with the Threemile project area would be subjected to prescribed burning, the majority of that acreage falling in Threemile Creek. No adverse effects are anticipated to riparian areas, wetlands, floodplains, or springs from implementation of project activities. (Water Resources Report, p. 24, project record).

Alternative B – Modified Proposed Action

Direct and Indirect Effects

Changes to Surface Water Quality

Under Alternative B, model outputs suggest that sediment yield under both the 5-year and 10-year RI precipitation scenarios would be roughly the same as under Alternative A for both the Home Creek and Otter Creek-Newell Creek 6th HUCs (Table 23, below). Hillslope sediment yield is expected to be lower in units treated in the Otter Creek-Newell Creek 6th HUC than under the no treatment scenario, likely due to increased downed wood associated with the proposed commercial harvest activities. In the Tenmile Creek 6th HUC, sediment yield is likely to be lower for both the the 5-year and 10-year RI precipitation scenario than under Alternative A. Much of the treatment in the Shorty Creek 6th HUC was dropped under Alternative B, thereby reducing overall site disturbance and erosion and sedimentation risk. (Water Resources Report, p. 25, project record).

As with Alternative A, model outputs indicate that Unit 914 may be responsible for the majority of all sediment yield in the Threemile 6th HUC under Alternative B. Without Unit 914, sediment yield would be reduced below levels modeled under no treatment across units treated in the remainder of the Threemile 6th HUC. As noted in Design Criteria 9, burning of Unit 914 would be completed in phases to minimize the risk of sediment conveyance to the North Fork of Threemile Creek should a high intensity thunderstorm event occur immediately following implementation. Regardless of how implementation is phased, the road encircling the further reduces the likelihood of sediment conveyance to Threemile Creek. (Water Resources Report, p. 25, project record).

Table 23: Modeled hillslope-related sediment delivery by 6th HUC. Included are Alternative B and a no treatment scenario in tons/yr under 10-yr (10% probability) annual precipitation and 5-yr (20% probability) annual precipitation.

	Alternative B		No Treatment	
6HUC Name	**Estimated 10 year RI sediment delivery (tons/yr)**	**Estimated 5 year RI sediment delivery (tons/yr)**	**Estimated 10 year RI sediment delivery (tons/yr)**	**Estimated 5 year RI sediment delivery (tons/yr)**
Home Creek	0.00	0.00	0.05	0.00
Otter Creek-Newell Creek	0.04	0.01	0.41	0.20
Tenmile Creek	6.47	1.95	7.87	4.16
Threemile Creek	32.35	4.43	19.29	10.23

(See also Table 10 in the Water Resources Report, p. 25, project record).

All sub-catchments are expected to have reduced sediment yield below levels projected under Alternative A (Table 24, below). As noted above, sediment yield from the Shorty Creek project units was modeled as essentially negligible under Alternative B. Nutter Draw is projected to have roughly the same sediment yield under the 10-year RI precipitation scenario as the no treatment scenario and is projected to have a reduction below no treatment levels under the 5-year RI event. Spike Camp Spring Draw, Watt Draw, and Yager Gulch are projected to have reductions in hillslope-related sediment delivery below levels modeled under the no treatment scenario. Coal Creek and Softwater Spring Draw are both anticipated to see a decrease in sediment yield above levels modeled under the no treatment scenario with the 5-year RI event but an increase in sediment delivery over the no treatment scenario at the 10-year RI precipitation scenario. Modeled increase in sediment yield was less than that modeled under Alternative A. As with Alternative A, should any increase in sediment yield be realized, it is likely that that yield would abate within 1-2 years following completion of project activities. (Water Resources Report, pp. 25-26, project record).

Table 24: Modeled hillslope-related sediment delivery by subcatchment. Included are Alternative B and a no treatment scenario in tons/yr under 10-yr (10% probability) annual precipitation and 5-yr (20% probability) annual precipitation.

	Alternative B		No Treatment	
Subcatchment Name	**Estimated 10 year RI sediment delivery (tons/yr)**	**Estimated 5 year RI sediment delivery (tons/yr)**	**Estimated 10 year RI sediment delivery (tons/yr)**	**Estimated 5 year RI sediment delivery (tons/yr)**
Coal Creek	4.73	1.33	3.72	1.97
Nutter Draw	5.14	1.85	5.28	2.93
Shorty Creek	0.02	0.00	3.83	2.02
Softwater Spring Draw	2.65	0.77	1.70	0.90
Spike Camp Spring Draw	0.59	0.18	1.24	0.57
Watt Draw	0.93	0.30	1.46	0.84
Yager Gulch	0.01	0.00	1.34	0.83

(See also Table 11 in the Water Resources Report, p. 26, project record).

Under Alternative B, 26.0 miles of temporary road would be built. Approximately 16.1 miles of temporary roads would fall on slopes greater than 15% within 300 feet of watercourses (i.e. high risk areas) (Table 25, below). Approximately 3.6 fewer miles of temporary roads would fall in high risk areas in Tenmile Creek and 0.4 fewer miles of temporary road would fall in high risk areas in Threemile Creek. Project area-wide estimated sediment yield from temporary roads

would decrease from 1.3 tons/year to 1.0 tons/year. Approximately 0.5 mile more temporary road would be built in Nutter Draw than what was proposed under Alternative A. Estimated annual sediment delivery from temporary roads, however, would be roughly the same under Alternative A as under Alternative B. (Water Resources Report, p. 26, project record).

Upon completion of project activities, temporary roads would be reclaimed. Upon full site recovery, sediment production is anticipated to return to background levels. (Water Resources Report, p. 26, project record).

Table 25: Estimated average annual sediment delivery for temporary roads that may fall within 300 feet of a perennial or intermittent under Alternative B broken down by 6th HUC (Top) and subcatchment (Bottom).

6th HUC Name	Alt B High Risk Mileage	Alt B Estimated average annual sediment delivery (tons/yr)
Home Creek	0.1	0.0
Otter Creek-Newell Creek	0.4	0.0
Tenmile Creek	4.8	0.3
Threemile Creek	10.9	0.7

Table 25 continued.

6th HUC Name	Alt B High Risk Mileage	Alt B Estimated average annual sediment delivery (tons/yr)
Coal Creek	1.6	0.1
Nutter Draw	4.7	0.3
Shorty Creek	1.5	0.1
Softwater Spring Draw	0.2	0.0
Spike Camp Spring Draw	0.5	0.0
Watt Draw	2.5	0.2
Yager Gulch	1.2	0.1

(See also Table 12 in the Water Resources Report, p. 26, project record).

In summary, model outputs suggest that project-related sediment yield under Alternative B would be generally less than under Alternative A. (Water Resources Report, p. 27, project record).

Changes to Watercourse Condition

With sediment delivery under Alternative B expected to be similar if not less than that anticipated under Alternative A, again no change in watercourse stability is anticipated under Alternative B. Riparian vegetation would not be lit during prescribed burning implementation, minimizing the potential for riparian vegetation mortality and subsequent destabilization. (Water Resources Report, p. 27, project record).

The crossings proposed for installation on Coal Creek would be installed so as to accommodate at least a 25 year runoff event (per Logan 2001). This crossing would be removed following completion of the project and the installation site would be reclaimed. No long term adverse effects are anticipated from crossing installation or removal. (Water Resources Report, p. 27, project record).

Changes to Riparian Areas, Wetlands, Floodplains, and Springs

As with Alternative A, riparian areas and wetlands would be buffered and avoided in stands where mechanical treatment would occur. Other than at temporary crossings, machinery would not operate in riparian areas or wetlands. Through implementation of temporary crossing design criteria, impacts on riparian areas and floodplains would be minimized in extent and duration.

Mechanical operations would not occur on any floodplains adjacent to perennial streams. (Water Resources Report, p. 27, project record).

Under the record of success in BMP and SMZ implementation and effectiveness discussed under Analysis Methods, the chance of long-term detrimental impacts to wetlands, riparian areas, and floodplains through project implementation is minimal. Custer Gallatin National Forest watershed personnel will work with project fuels specialists and sale administrators to avoid and/or minimize impacts as well as to monitor these resources during project implementation. (Water Resources Report, p. 27, project record).

Slightly less riparian acreage would be affected under Alternative B than Alternative A as a result of some broadcast burning units being dropped (Table 26 below). Project activities would only intersect riparian areas in the Tenmile Creek and Threemile Creek 6th HUCs. The small riparian-graminoid unit intersected by units under Alternative A would go away under Alternative B; only Riparian-Green Ash Woodland and Riparian-Shrub riparian types would be affected under Alternative B. Per Design Criteria 8, riparian vegetation would not be directly ignited during implementation of project activities, thereby minimizing the potential for deciduous woody vegetation mortality. (Water Resources Report, p. 27-28, project record).

Table 26: Acres of riparian area intersected by treatments proposed under Alternative B.

Alternative B	**6th HUC Name**		
Riparian/Woody Draw Local Classification and Proposed Treatment	**Tenmile Creek**	**Threemile Creek**	**Grand Total**
Riparian-Green Ash Woodland	***2.1***	***10.6***	***12.6***
Broadcast Burning		10.4	10.4
Broadcast Burning for Non-Forest Restoration	2.1	0.1	2.2
Riparian-Shrub		***0.6***	***0.6***
Broadcast Burning		0.6	0.6
Grand Total	**2.1**	**11.2**	**13.2**

(See also Table 13 in the Water Resources Report, p. 28, project record).

Through implementation of design criteria, no adverse effects are anticipated to the small, disjunct floodplains in project area. Further, no further impacts to springs would occur as a result of implementation of Alternative B. (Water Resources Report, p. 28, project record).

Conclusion

Under Alternative B, no measurable change in water quantity is anticipated. Sediment is the only pollutant that may be conveyed to draw bottoms and/or stream channels. Potential effects are variable, with no change in sediment delivery in Home Creek, a possible reduction in sediment

delivery in Otter Creek-Newell Creek, and a potential reduction in sediment delivery under low intensity rainfall events and increase in sediment delivery under higher intensity rainfall events in Threemile Creek and Tenmile Creek. Potential increases in sediment, where deemed feasible, are likely to be lower under Alternative B than Alternative A. Any potential increase in sediment production would be short-lived. (Water Resources Report, p. 28, project record).

There is low potential for watercourse condition compromise as a result of the limited short-term sediment conveyance potential from project implementation. A low percentage of riparian vegetation with the Threemile project area would be subjected to prescribed burning, the majority of that acreage falling in Threemile Creek. Slightly less riparian vegetation may be affected by prescribed fire under Alternative B than Alternative B. No adverse effects are anticipated to riparian areas, wetlands, floodplains, or springs from implementation of project activities. (Water Resources Report, p. 28, project record).

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Regarding ongoing grazing, grazing activities are managed per direction in Allotment Management Plans within those allotments intersecting the project area. These plans provide the flexibility to adjust management- through such tools as deferment or changes in timing and intensity of grazing- as needed to address environmental conditions and/or mitigate resource impacts as needed, irrespective of other management activities that may be occurring in a given area. (Water Resources Report, pp. 28-29, project record).

Per Design Criteria 8 and 11 as prescribed in the Soils specialist report, cattle grazing would be deferred following implementation of both commercial harvest and prescribed burning to allow for site recovery, subject to bounds of applicable grazing permits and associated administration. In doing so, no exacerbated effects to surface water quality, watercourse condition, or riparian areas, wetlands, floodplains, or springs are anticipated. (Water Resources Report, p. 29, project record).

Alternative C- No Action Alternative

Changes to Surface Water Quantity

Under the No Action Alternative, there is no potential for change in water yield or peak flows through over-story vegetation change; no change in water yield or peak flows would occur at either the 6th HUC or smaller catchment scale. (Water Resources Report, p. 29, project record).

Changes to Surface Water Quality

The existing road network would continue to be used and maintained under standard maintenance intervals. Exacerbated sediment yield potential associated with construction of new roads would not occur. (Water Resources Report, p. 29, project record).

Should a wildfire burn through the project area 6th HUCs and sub-catchments, there would be elevated potential for increased erosion and sediment yield. Burn severity, slope gradients, soil types, and proximity to water bodies would all have bearing on longevity of post-fire sediment yield increases should any increase occur. (Water Resources Report, p. 29, project record).

Changes to Watercourse Condition
As noted above, with no fuels management activities there is no potential for change in water yield or peak flows. As such, stream channel stability would remain subject to natural hydrograph fluctuations and stormflow conveyance. (Water Resources Report, p. 29, project record).

Cattle grazing would continue to occur throughout the Threemile project area. Where accessible, it is likely that cattle will continue to walk through wetlands and graze along stream banks. In some locations, should a large runoff or debris flow event occur, areas of denuded vegetation may experience increased scour as a result of grazing impacts. These scoured areas would likely be localized to the direct vicinity of those locations affected by cattle. (Water Resources Report, p. 29, project record).

Changes to Riparian Areas, Wetlands, Floodplains, and Springs
Under the No Action Alternative, riparian areas and wetlands would continue to respond to natural processes such as periodic floodplain inundation and fluctuation in water tables due to annual and inter-annual precipitation variability. (Water Resources Report, p. 29, project record).

Conclusion
Under the No Action Alternative, water resources would remain in roughly there current state and would continue to respond to natural processes and ongoing management within the project area. (Water Resources Report, p. 30, project record).

Soils

Effects common to all action alternatives

Ponderosa pine planting
Hand planting of ponderosa pine planting would occur under both Alternatives A and B. Effects would be minor from hand-scalped areas to plant trees. (Soils Report, p. 12, project record).

Commercial timber harvest and prescribed burning
Soil organic matter and nutrients
Organic matter and nutrient effects associated with commercial harvest
For all proposed harvest units, approximately 3-5 tons per acre of coarse wood would be retained on site. These CWD loads were arrived at via a) interdisciplinary review of recommendations made by Graham and others (1994) for maintenance of long-term forest productivity in habitat types found within the project area, and b) monitoring of stand conditions before, during, and after numerous projects across the Ashland and Sioux Ranger Districts. (Soils Report, p. 12, project record).

Maintenance of down coarse wood within the natural range of variability for the Ashland area and compliance with R1 soil quality guidelines would likely lead to no long-term adverse effects on soil organic matter and nutrients in units proposed exclusively for commercial timber harvest.

Though indirect in nature, should harvested stands be subjected to wildfire while down coarse wood remains within the natural range of variability, soil burn severity may be reduced to some degree and extent over what would occur in absence of prescribed burning? While this would be considered a positive benefit of project activities, it is important to note that site-specific

conditions have direct bearing on whether such an outcome would be achieved. (Soils Report, p. 12, project record). (Soils Report, p. 12, project record).

Organic matter and nutrient effects associated with prescribed burning

By emulating burn severities that would occur under the low to moderate intensity/severity-high frequency fire regime typical of this landscape, prescribed burn activity would also facilitate occurrence of the suite of resource effects that would accompany natural wildfire in high plains rangeland and ponderosa pine ecosystems. Nutrients in litter and organic horizons are readily volatilized during combustion (for forest soils, DeBano 1990; for rangelands, Blank et al. 2007). Under a high frequency low severity fire regime, organic matter turnover will occur where a portion of nutrients, cations, and organic material remain available as a result of low severity fires incompletely consuming litter and organic material. Short-lived periodic increases in plant available nitrogen (the most limiting nutrient in these ecosystems) would occur followed by rapid vegetation uptake (Neary et al. 2005). Where down 1,000 hour fuels dominate the proposed burn unit, burning when fuel moistures are above thresholds where detrimental soil effects have been observed in past burns would ensure that organic matter loss through high severity burning would be minimized. (Soils Report, p. 12, project record).

Soil and vegetation recovery following low severity burning generally occurs rapidly (e.g Neary et al 2005; Robichaud et al 2010). Sites burned under low intensity/severity have been shown to recover within 1-3 years post-fire. Monitoring of the Ash Creek Fire one year post-fire found that areas burned under low severity could not be differentiated from areas not burned one year prior (Efta and Dibenedetto 2015). From these observations, it can be reasonably assumed that in absence of other disturbance organic matter and associated nutrients volatilized and/or mobilized during combustion would return to the site relatively quickly. (Soils Report, p. 13, project record).

Pile burning would result in loss of organic matter across localized areas within treated units. Implementation of site reclamation would ensure site recovery and maintenance of long-term soil productivity. Informal monitoring of burn piles in the Russell Timber Sale on the Sioux District suggests that burn piles may largely recover within ten years following project implementation and perhaps faster should design criteria be fully implemented. (Soils Report, p. 13, project record).

Soil organisms

With the symbiotic relationship between soil organisms and soil organic matter, response of soil organisms to proposed management activities is expected to correspond to soil organic matter dynamics. Accordingly, through maintenance of coarse wood and minimization of soil disturbance during operations, effects to soil microorganisms would be minor. (Soils Report, p. 13, project record).

With respect to prescribed burning and pile burning, the ability of soil microorganisms to move from undisturbed sites to disturbed sites would minimize losses and facilitate recovery of soil microbiology. Prescribed burning yields largely low burn severities and as such soil organism recovery is projected to be rapid. Recovery of pile burning sites would inevitably be less rapid but through implementation of design criteria would be expedited to the greatest extent possible. (Soils Report, p. 13, project record).

Soil erosion and mass wasting

Soil erosion potential has been discussed in detail within the Water Resources Report for both commercial harvest and prescribed burning activities. (Soils Report, p. 13, project record).

Following project implementation, reclamation of landings and skid trails would minimize post-treatment erosion potential. As vegetation recovers on site, erosion potential is expected to decrease to background levels. (Soils Report, p. 13, project record).

As noted within the Water Resources Report, a short-term increase in sediment delivery is possible following burn implementation, followed by recovery to current levels as vegetation and litter reestablish on site. As noted above, this is projected to occur within 1-2 years post-fire. This short-term pulse in itself would not constitute detrimental soil disturbance. Pile burning is not expected to yield measurable soil erosion and delivery due to vegetative buffers between piles and proposed project mitigations. (Soils Report, p. 13, project record).

Mass wasting is a highly episodic and variable geomorphic process. As such it is extremely difficult- if not impossible- to predict. With implementation of appropriate BMPs (minimizing road length in sensitive soil types and on steep slopes, ensuring adequate road drainage, etc.) however, it is highly unlikely that mass wasting would occur as a result of project activities in this physiographic setting. (Soils Report, p. 13, project record).

Cumulative Effects Common to Action Alternatives

Spatial and Temporal Context for Effects Analysis

The spatial and temporal boundaries for analyzing cumulative effects to soils are the same as under those outlined under Methodology. (Soils Report, p. 14, project record).

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Through project planning and design, overlap between management activities where detrimental resource effects could occur have largely been addressed. (Soils Report, p. 14, project record).

Grazing is ongoing throughout the project area across six different allotments. Per Design Criteria 8, grazing would be deferred post-implementation for at least one season, subject to the bounds of applicable allotment management plans and annual operating instructions. Under full compliance with these design criteria, negative cumulative impacts are not anticipated as a result of grazing occurring directly following implementation of prescribed burning or commercial harvest. Robinson (2011) observed evidence of cattle-related soil disturbance across less than 1% of the areal extent of all soil disturbance in uncut stands within study areas on the Ashland District. While the grid-based sampling technique used by Robinson carries some inherent error, assuming that total areal extent of cattle disturbance in harvested timber stands is 1% +/- 2 to 3% (a scenario which is reasonably likely, per past monitoring completed in the Opeechee Timber Sale (Efta 2017)), short of total extent of unit DSD remaining near 15% one to two seasons following implementation it is likely that the proposed action would not cumulatively result in deviation from R1 soil quality guidelines. In some cases, coarse wood accumulations immediately post-implementation may increase and in doing so preclude short-term cattle access. (Soils Report, p. 14, project record).

Prescribed burning results in removal of fine fuels (forage for cattle) and can increase nutrient availability that boosts vegetation regrowth. Fire amplifies the nutrient cycles leading to pulses

of available N (Neary et al. 2005). Some movement of phosphorus may occur with sheetwash but this is minor in this landscape setting. Grazing may delay recovery of plants and ground cover that protects against erosion of bare soil after the prescribed fire. The Ashland area has particularly high incidence of thunderstorms that can erode soils. Under Design Criteria 11, grazing would be deferred post-implementation, thereby minimizing the potential for impairment of short and/or long-term productivity. (Soils Report, p. 14, project record).

Alternative A – Proposed Action

Under Alternative A, approximately 8,056 acres would be treated. Alternative A would commercially harvest 3,012 acres, burn 4,791 acres outside of harvesting, and plant 253 acres. See Table 3 in the Soils Report, project record, includes a breakdown of acreages across each geology-vegetation hybrid map unit type. The majority of commercial harvest activity would occur in ponderosa pine stands underlain by Fort Union sandstone. Through project design, units in FortUnion-HSSTD (Midway) soils have been largely excluded from treatment to avoid detrimental effects to soil productivity. Treatment activities fall in Midway soils largely due to the way the "remapping" process was conducted; in reality, proposed management activities would not fall in soils of this type except along a rare unit edge where these soils may abut project units. (Soils Report, p. 14, project record).

Approximately 29 miles of temporary road and 187 landings would be constructed under this alternative. (Soils Report, p. 14, project record).

Direct and Indirect Effects

Physical soil properties

Physical soil disturbance related to commercial timber harvest

Under Alternative A, direct effects on soil physical characteristics from commercial harvest activities would occur within the boundaries of the proposed stands, within the temporary road prisms, and across skid trails. Machine traffic would displace, compact and rut soils from multiple passes. To control for these effects, ground based harvest would have designated skidtrails. Compaction and displacement and rutting would be most pronounced along primary skid trails. The proposed treatment areas would be harvested using designated trails and landings that are laid out to occupy less than 15 percent of the activity unit. To the extent feasible, trails and landings would utilize existing roads and trails. (Soils Report, p. 15, project record).

Evaluation of post-implementation DSD suggested that the following units would likely not be in compliance with R1 DSD guidelines by virtue of being small units, requiring lengthy temporary road segments to access the units, and requiring multiple landings:

22, 58, 66, 81, 89, 90, 102, 118, 119, 230, 231, 240, 368

(Soils Report, p. 16, project record).

These units would require further mitigation efforts to set soils on a recovery trajectory following completion of harvest activities. (Soils Report, p. 16, project record).

All other selected units with Alternative A would comply with R1 DSD guidelines based on results from monitoring and published research. Monitoring of the Opeechee timber sale that

occurred on similar physiography, climate and parent materials to Threemile project area found that all harvest units were in compliance with R1 soil guidelines. Robinson (2011) found similar results although with values up to 10% DSD in past harvest units from 0 to 10 years old on the Ashland district. Reeves and others (2011) collected, collated, and statistically analyzed current and legacy soil monitoring data from 11 National Forests in the Forest Service's Northern Region, including the Ashland and Sioux Districts of the Custer National Forest. Project results found ground-based harvest systems to have a mean areal extent of 5% DSD following project implementation. Past experience has found that close interaction between FS timber sale administrators and watershed personnel is important for ensuring maintenance of soil productivity through implementation of project activities. (Soils Report, p. 16, project record).

Under Alternative A, approximately 6.9 miles of temporary roads would be built in clinker parent materials. NRCS has identified Ringling series soils as having "severe" limitations specific to construction of haul roads and log landings, meaning that one or more limitations may make construction very costly or difficult. Given the site context, these ratings are likely primarily a result of average slope as well as depth to a restrictive layer. Of those roads proposed in clinker parent materials, approximately 4.4 of those miles would fall on slopes greater than 15 percent. These roads constitute the highest risk for long-term loss of soil productivity. During project implementation, extra coordination between CGNF sale administration watershed personnel may be required to minimize risk associated with road construction in these conditions, including but not limited to application of scoria gravel and addition of extra drainage features. (Soils Report, p. 16, project record).

Following project implementation, temporary roads and landings would be ripped and seeded. Past monitoring, including most recently the Opeechee Timber Sale in the Ekalaka Hills unit of the Sioux Ranger District, has indicated good success with reclamation of temporary roads. The Sioux Ranger District has similar geology, soils, climate, and physiography to the Ashland District. (Soils Report, p. 16, project record).

Due to a combination of soil attributes and general physiographic location (i.e. ridgetops and slopes), soils in clinker parent materials may require 1-2 year longer longer recovery following disturbance than soils in Fort Union parent materials. Field reconnaissance conducted in support of the Phoenix Salvage and North Whitetail projects provide testament to the prolonged recovery associated with wildfire-related disturbance (see Soils Specialist Reports and associated project records for further detail). It should be emphasized that physiographic location may play a strong role in dictating recovery time; soil recovery following project work conducted in clinker soils in some locations may not be noticeably different than where activities conducted in Fort Union parent materials. (Soils Report, p. 16, project record).

Physical soil disturbance related to prescribed burning

Approximately 5,970 acres would be prescribe burned under Alternative A (Table 3). Nearly 2,000 acres of the proposed burning would be in rangeland vegetation and the 3,970 acres would occur within overstory ponderosa pine stands. A portion of the 2,000 acres occurring in rangeland vegetation includes Unit 914, where portions of the unit have concentrations of down coarse wood from fire-related overstory mortality from the Watt Draw fire. Roughly forty percent of the acreage proposed for burning in ponderosa pine stands would overlap with areas also slated for commercial timber harvest activities. (Soils Report, p. 17, project record).

Prescribed burning has been proposed in units where coarse wood and fuels in general is in excess of what would occur under the natural range of variability, and there is a desire to maintain rangeland vegetation extent and vigor. (Soils Report, p. 17, project record).

Qualitative and quantitative monitoring of wildfire and prescribed fire effects on soil resources from 2014 through 2017 has identified several preliminary conclusions and guiding best practices that have bearing on burn pattern dynamics and associated soil resource effects related to prescribed burning. The range of fuel models evaluated during that time frame are the same as those found in units proposed for treatment under the Threemile project. Preliminary conclusions and guiding best practices include (per Efta 2017):

- Dead fuel moistures appear to have direct bearing on soil burn severity and extent resulting from wildfire and prescribed burning, but further monitoring is needed to more fully understand the role of interacting factors such as soil moisture, overstory canopy cover, live fuel moistures, and weather at the time of burn operations.
- Forest canopy cover (or lack thereof) may have less bearing on burn severity and extent than soil moisture at the time of ignition. This conclusion is based on qualitative and quantitative characterization of burn severity indicators across two fires coupled with visual assessment of burn extent, not physical mapping of aerial extent.
- Whenever possible, burn operations should be conducted while 1,000 hour fuel moistures fall at the upper end of ranges deemed appropriate for achieving desired consumption during burning.
- Recent monitoring suggests that for locations in fuel model TL7 (Scott and Burgan 2005), dead and down 1,000 hour fuel moistures on or near ridgetops should be in excess of 12-15% at the time of ignition to minimize extent of high to moderate burn severity resulting from project implementation.
- Soil moisture appears to be an important variable to evaluate when assessing site readiness for prescribed burning. Future monitoring needs to focus on this site attribute and interactivity with live and dead fuel moistures to discern under what conditions are soil attributes best maintained.
- A change in lighting strategy, specifically lighting individual down logs, during prescribed burning operations may present a viable way to minimize burned soil extent. This strategy, however, is extremely labor and resource intensive. Conducting burn operations in down heavy fuels when fuel and soil moistures are optimal is a less labor-intensive approach to minimizing soil burn effects than lighting individual logs. Optimal burn windows, however, occur much less frequently.

(Soils Report, pp. 17-18, project record).

Project design and prescribed design criteria and mitigations have worked to incorporate the lessons learned from this monitoring (See Design Criteria listed above as well as design criteria included in the Fire and Fuels Report). Assuming that all prescribed design features are fully implemented, prescribed burning is not anticipated to be in violation of R1 soil quality guidelines in the short term. (Soils Report, p. 18, project record).

With respect to units falling in largely rangeland vegetation, past experience has shown that prescribed fire in this vegetation type, especially during the time of year in which prescribed burning occurs, generally results in low burn severity. No detrimental effects to soil aggregate

stability are anticipated from fires burning under these conditions. (Soils Report, p. 18, project record).

Proposed burning activities would take advantage of existing roads as firelines. Direct effects on soil physical characteristics would likely be a result of dealing with unforeseen circumstances such as "slopover" or spotting since the proposed project area was designed with the intent of utilizing existing roads and trails as holding lines. Detrimental effects would be localized in extent and rehabilitated as appropriate (per Design Criteria 10). Rehabilitation activities may include but not be limited to seeding with native plants and soil aeration/ripping. (Soils Report, p. 18, project record).

Pile burning would likely result in dessication of soil aggregates in surface horizons and possibly isolated hydrophobicity. While no recovery monitoring is available for slash piles on the Ashland District, informal monitoring of burn piles in the Russell Timber Sale on the Sioux District suggests that soils under burn piles may largely recover within ten years following project implementation and perhaps faster should design criteria be fully implemented. (Soils Report, p. 18, project record).

Past monitoring has suggested that two prescribed fire entries may be required to achieve desired levels of coarse wood consumption when implementing prescribed burns in units with similar coarse wood concentrations to those encountered within the proposed project units. Site readiness from a soils perspective should be evaluated prior to a second prescribed burn entry. (Soils Report, p. 18, project record).

Alternative B – Modified Proposed Action

Under Alternative B, approximately 7,417 acres would be harvested or prescribed burned, roughly 600 fewer acres than under Alternative A. 3,159 acres would be harvested, 4,004 burned and 253 planted. Approximately 100 fewer acres would be treated in clinker-HSSTD geo-veg units (i.e. Ringling-Relan soils), 100 fewer acres would be treated in clinker-PIPO geo-veg units (i.e. Ringling soils), roughly 270 fewer acres would be treated in Fort Union-HSSTD geo-veg units (i.e. Farland-Cabba soils), and 160 fewer acres would be treated in Fort Union-PIPO geo-veg units (i.e. Cabba-Barvon soils) (see Table 4 in the Soils Resource Report). As with Alternative A, project activities have largely been excluded from Midway soils and may intersect this soil type only occasionally along unit boundaries. (Soils Report, p. 19, project record).

Additionally, approximately 26 miles of temporary roads and 192 landings would be constructed under this alternative. (Soils Report, p. 19, project record).

Direct and Indirect Effects

Physical soil properties

Physical soil disturbance related to commercial timber harvest

Under the Modified Proposed Action, commercial harvest units that were likely to not comply with R1 soil quality guidelines under Alternative A were reevaluated. Where feasible, updates were made to harvest systems (reduce total number of required landings and/or required temporary road miles) and/or unit configuration to ensure compliance with soil quality guidelines. In some cases, unit dimensions were altered after further review to better reflect likely dimensions on the ground, in doing so being more likely to meet soil disturbance

guidelines. Where site conditions precluded any of the above conditions, units were dropped from the project. Accordingly, there is a high likelihood that all proposed commercial harvest units would be in compliance with R1 soil quality guidelines prior to implementation of required post-implementation reclamation activities. (Soils Report, p. 20, project record).

With fewer overall acres of commercial timber harvest (how many), there would also be less overall potential for detrimental soil disturbance to be incurred under Alternative B. Total road mileage under Alternative B would be 26 miles instead of 29. Despite the reduction in road mileage, there would be a slight increase (approximately three tenths of a mile) of road length in clinker parent materials under this alternative that can have longer recovery time after reclamation of temporary roads. (Soils Report, p. 20, project record).

Soil disturbance related to prescribed burning

Total prescribed burning acreage would be approximately 790 acres less under Alternative B than Alternative A. Prescribed burning acreage proposed within the upper portions of the Shorty Creek drainage were dropped to address wildlife concerns. Acreage dropped spanned rangeland vegetation, standalone prescribed burning in ponderosa pine stands, and to a lesser extent stands that were also proposed for commercial timber harvest. The less acreage burned lessens potential risks from burning overall, but also negates positive effects from stimulating nutrient production. (Soils Report, p. 20, project record).

No Action Alternative

Under the No Action Alternative, no project work would be implemented. No mechanized equipment operation or prescribed burning would occur. Further, there would be no hand planting of ponderosa pine within the project area. (Soils Report, p. 20, project record).

Direct and Indirect Effects

Physical Soil Properties

With no project implementation, there would be no changes to soil physical characteristics such as rutting, compaction, or soil displacement. (Soils Report, p. 20, project record).

Given the fire regime pervasive throughout southeast Montana and the frequency that fire has been encountered within the project area vicinity, it is probable that proposed project units would be subjected to fire in the near future (10-20 years or sooner). Assessment of soils-related effects incurred as a result of such a wildfire carries with it a high level of uncertainty. The uncertainty depends on the fuel accumulations and the wildfire driven climatic conditions. In general, higher fuels accumulation during extreme fire weather could lead to greater moderate and severe fire that initially bare soils. The recovery after the fire depends on seasonal moisture, soily type and vegetation. In a general sense, observations of wildfire burned ground have found soils burned under moderate to high severity will take longer to recover than those burned under low severity (e.g. Efta and Dibenedetto 2015). The no-action alternative risks leaving higher fuel accumulations that have potential for burning more severely. (Soils Report, pp. 20-21, project record).

Soil Organic Matter and Nutrients

With no action, standing dead trees would eventually fall to the forest floor and add to the coarse and fine wood pool. Needles and branches would remain on the site and fall to the ground, thereby providing a source of nutrients on site. Nutrients associated with this material would

slowly become available for plant growth through the ongoing decomposition process. As the tree canopies close in and shade the soil surface, decomposition rates would slow, allowing organic matter and nutrients to accumulate on the soil surface. This process would continue until another major disturbance such as fire or a windstorm opens the tree canopy and speeds up the recycling process. (Soils Report, p. 21, project record).

Organic rich topsoil contains the bulk of available carbon, macronutrients, and biological activity for soil. Nutrients in litter on the soil surface are readily volatilized during combustion and lower down in soil where sustained heating occurs such as under logs (DeBano 1990), often creating a net reduction in total nitrogen following fire. Many of the range soils have much of the organic matter throughout the mineral topsoil and not concentrated in the forest floor due to the abundance of herbaceous plants. Thus, fire reduces a small majority of total soil organics. Burning through forests and on poor soils that lack nutrient rich topsoil has a larger proportional effect on total nutrient capital (P. -Dumroese and Jurgensen 2006). Differences between not treating and the action alternatives would be subtle due to the predominance of range soils. Both wildfire and prescribed burning would lead to short-lived increases in plant available nitrogen (the most limiting nutrient in these ecosystems) followed by rapid vegetation uptake following recovery (Neary et al. 2005). Negative impacts from removing already scarce cover would be isolated where wildfire burned on poor soils. (Soils Report, p. 21, project record).

Soil Organisms

With the symbiotic relationship between soil organisms and soil organic matter, response of soil organisms to proposed management activities is expected to correspond to soil organic matter dynamics. With no projected change in soil organic matter under the No Action alternative, there would be no management-related effect on soil organisms. Soil organisms would continue to respond to natural disturbance processes. (Soils Report, p. 21, project record).

Soil Erosion

With no mechanized equipment operation or prescribed burning, management activity would not alter soil erosion rates from background levels under the No Action Alternative. (Soils Report, p. 21, project record).

Monitoring documented within Efta and Dibenedetto (2015) found that 79% of plots revisited one year post-Ash Creek wildfire exhibited evidence of erosion. Of note is that the majority of these plots correlated with areas burned under moderate severity. Erosion modeling conducted as a part of the 2012 Ash Creek Fire Burned Area Emergency Response effort suggested that first year post-fire erosion rate may roughly double with each respective increase in degree of burn severity. (Soils Report, p. 21, project record).

Taken together, these data suggest in increased potential for soil erosion within areas burned under moderate to high severity in the event of a wildfire. With an elevated probability of exacerbated burn severity in more dense fuel models, there is some potential for elevated soil erosion under the no treatment alternative in the event of a wildfire. Total erosion and sediment delivery, however, is contingent on extent of burned area and degree of burn severity. (Soils Report, p. 22, project record).

Botany

Ground-disturbing activities have the potential to impact Endangered, Threatened, Proposed, and Sensitive (TES) plants. The risk of adverse effects on TES plants from activities varies with activity type, timing of activity, extent of activity, habitat suitability, and the species at risk. Plant surveys and mitigation measures are designed to protect populations and suitable habitat. (Botany Report, p. 1, project record).

The purpose of this analysis is to determine what potential impacts may occur to TES species from the proposed management activities of the Threemile Restoration and Resiliency Project, to insure that the alternatives do not contribute to loss of sensitive plant population viability, and to insure compliance with Forest Service and other federal policies. This analysis discusses the current status and distribution of known sensitive plant populations and habitat within the analysis area, and how planned activities could be expected to impact them. (Botany Report, p. 1, project record).

Alternatives A and B – Action Alternatives

Direct and Indirect Effects

From a sensitive plant standpoint, the two action alternatives vary little in their scope of effects and will be consolidated for this effects analysis. The planting activities proposed for the project do not occur in areas with sensitive plant habitat and so will not affect sensitive plant species in the area. In general, harvest activities should have little impact on sensitive species. *A. barrii* and *L. nuttallii* typically occur in sparsely vegetated habitats with little canopy cover. Although *L. nuttallii* can occur in open woodlands, nearly all cutting units have areas of canopy cover of at least 25%. Review indicates that there would little if any suitable habitat for *C. parviflorum* within the commercial harvest areas. This species requires moist, forested areas with a high percentage of forbs and often moss cover. These conditions may exist in some draws within the project area, but these draws do not have the calcareous soils associated with *C. parviflorum* habitat. *Carex gravida* var. *gravida* grows in mesic/moist conditions. Within the project area these types of habitats can be found within woody draws. Some harvest may occur in woody draws to remove ponderosa pine and release the shade-intolerant deciduous tree or shrub species.In these woody draws all ponderosa pine within 1 to 1 -1/2 tree height would be removed. This would allow green ash, box elder, willow and other shade intolerant deciduous species to regenerate and increase diversity across the landscape that are now being held back by the shade of ponderosa pine trees. The number of acres to be treated this way would be considered incidental to the commercially treated units and not broken out as a separate treatment activity(Botany Report, pp. 2-3, project record)..These types of harvest will be incidental to the commercially treated units and will only happen in a small number of units. Should *C. gravida* var. *gravida* be present some individuals could be lost. The scale of such losses would be small given the projected extent of possible harvest activities. Long-term, removal of the ponderosa pine overstory in these areas should promote a more healthy and diverse vegetative community supporting this species habitat. (Botany Report, p. 3, project record).

The prescribed fire and broadcast burns planned in the project may affect each sensitive species in different ways. *Astragalus barrii* and *Lomatium nutallii* typically occur in open areas with sparse vegetation. Proposed broadcast burns would be occurring in areas with potential habitat.

However the sparsely vegetated nature of *A. barrii* and *L. nuttallii* habitats make high-intensity fire unlikely. It is presumed that both species are adapted to periodic low-intensity fire, which is the typical fire regime across this landscape. High-intensity fire or long retention times due to accumulated fuel loads would pose a greater risk. The moist nature of the locations where *C. gravida* var. *gravida* exists may be resistant to the effects of at least low-intensity fire. Heidel et. al. (2002) documented fire scars on ponderosa pine trees at one *C. gravida* var. *gravida* site, indicating the species is capable of surviving some ground fires. In contrast, high-intensity fires that remove overstory cover could lead to at least temporary changes to the moisture regime and a high-competition situation in which C. gravida var. gravida may not survive (Heidel et. al., 2002). However, all burning activities for the Threemile Restoration and Resiliency Project would occur after harvest or in previously burned areas which would result in lower intensity fires. (Botany Report, p. 3, project record).

Indirect effects of project activities may be the expansion of noxious weed populations. Because of the moist nature of *C. gravida* var. *gravida* habitats, they may be particularly susceptible to weed invasion if disturbed (Heidel et. al., 2002). Currently the Three Mile Project area is relatively free of noxious weeds. There are small patches of spotted knapweed (*Centaurea stoebe* spp. *micranthos*) in disturbed areas such as around water tanks and along roadways. Larger infestations occur in the Coleman Draw allotment in areas that were historically terraced and replanted with crested wheatgrass. A total of 542 gross acres are impacted by spotted knapweed (133 acres of actual infestation). No other state listed noxious weeds are known to occur in the project area. Leafy spurge, houndstongue, and Canadian thistle exist on the Ashland Ranger District but have not been fully inventoried. Design features that are meant to minimize the risk of weed expansion include: washing heavy equipment prior to entry into the project area, use of weed free seed and materials, and noxious weed surveys and treatment for 6 years post-project on all open, closed, and temporary roads and other areas affected by project activities. All noxious weed infestations will be treated using an Integrated Pest Management approach. Integrated Pest Management procedures and mitigation measures are expected to control the increase in noxious weeds in the long-term however, increases in noxious weed infestation may occur in the short-term. (Botany Report, p. 1, project record).

Cumulative Effects

Spatial and Temporal Context for Effects Analysis

Geographic scope of potential effects (direct, indirect, and cumulative) is determined by a combination of factors including: activity areas, geographic location, the scope of the proposed action, resources and species which may be present, consequences and scope of effects, and the ability to measure effects. The scope of action and potential for adverse effects determines the extent of analysis necessary. The geographic scope of analysis for sensitive plant species in this project are the treatment areas within the Threemile Restoration and Resiliency Project. This analysis considers short and long-term management as it may affect known or suspected populations of sensitive plant species as well as their potential habitat. This analysis considers past activities from 2000 to activities planned within the next 10-20 years. This time frame encompasses the large scale, high intensity fires that have largely defined the character of much of the area. Activities that occurred before this time period, were largely overburned by these fires. (Botany Report, pp. 3-4, project record)

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past activities on federal and other lands, including fire, road construction, grazing and timber harvest may have affected potential sensitive plant habitat and possibly populations in the past, but the degree to which this may have occurred is unknown. High intensity fire has the greatest potential to affect any populations of sensitive plants, however future occurrences of fire events of that severity are unpredictable and cannot be effectively analyzed for cumulative effects. All other ground-disturbing activities on National Forest lands would be or have been evaluated according to policy and regulation through surveys and biological evaluations as to their impact on sensitive plant species designated by the Regional Forester prior to implementation. The impacts from proposed project activities on sensitive plants may impact some individuals and it is not unreasonable to expect that future activities might also impact individuals on federal lands. Design criteria would be applied to protect sensitive plant species and viability for any populations discovered prior to project implementation on National Forest System lands. Barring any catastrophic events, these activities are not expected to extirpate any existing populations on federal lands. (Botany Report, p. 4, project record).

Conclusion

While habitat for three of the four species on the Ashland District's sensitive species list was determined to have potential to occur based upon the best information available, the degree to which these habitats actually occur is unknown. Burning and/or commercial harvest activities may have detrimental effects to individual plants, but loss of whole populations of would not be expected given the scale and degree of these activities (ie. low-intensity fire and incidental tree harvesting). The loss of individual plants would not contribute to a decline in the persistence of, or result in a trend toward federal listing for any of the four sensitive species analyzed. Some project activities may promote beneficial conditions in the long-term for some sensitive species such as promoting a diverse deciduous woody draw vegetation or the removal of encroaching trees. Effects to sensitive species are determined from field surveys, known sensitive plant locations and habitat potential or habitat/site characteristics (landtype, habitat type, aspect, and elevation) are summarized in Table 27, below. (Botany Report, p. 4, project record).

Table 27. Sensitive Plant Species Considered in the Analysis and Determination of Effects for Both Action Alternatives

Plant Name	Potential Habitat Y/N	Documented in Project Area?	Determination of Effect[1]
Barr's milkvetch *Astragalus barrii*	Yes	No	May Impact
Nuttall's desert-parsley *Lomatium nuttallii* (Species of Cultural Interest)	Yes	No	May Impact
Pregnant sedge *Carex gravida* var. *gravida*	Yes	No	May Impact
Small yellow lady's slipper *Cypripedium parviflorum*	No	No	No Impact

[1]Options in determination of effects: (1) No impact; (2) May impact individuals, but is not likely to cause a trend to Federal listing or loss of viability; (3) Will Impact- Likely to result in a trend to Federal listing or loss of viability; and (4) Beneficial impact. There would be "no impact" to sensitive species determined to be absent from the project area or lacking habitat within the project area.

(See also Table 2 in the Botany Report, p. 4, project record).

No Action Alternative

Habitat for each sensitive plant is suspected to occur within the project area. The broadcast burning proposed in the Threemile Project is meant to maintain or improve the non-forested nature of some areas by killing encroaching trees, and to reduce fuel loading across the landscape with the hope of promoting the historical pattern of low intensity but frequent fires. Many of these non-forested areas have the potential for *Astragalus barrii* and *Lomatium nuttallii* habitat which might gradually shrink without treatment if their sparsely vegetated nature is maintained by fire and not soley edaphic conditions. Additionally, woody draw treatments wherein ponderosa pine would be removed would not occur. The purpose of these treatments is to enhance the typical, shade-intolerant vegetation found within woody draws. Because woody draws are often the preferred habitat for *Carex gravida* var. *gravida*, these types of treatments, which are meant to increase the diversity and resilience of the habitat, may benefit the species. Without them, ponderosa pine will continue to grow and shade out other vegetation leading to a loss of diversity and resilience in these systems over time. (Botany Report, p. 5, project record).

Comparison of Alternatives

It is unknown the degree to which commercial cutting activities differ between the two action alternatives. The incidental nature of this activity may mean that it does not occur at all in any place with *Carex gravida* var. *gravida* habitat, meaning there would be no difference between any of the action alternatives. The proposed action has the greatest amount of burning taking place. Burning is planned to be of a low-intensity and therefore effects are not expected to be adverse. The proposed action has the highest number of acres to be burned, and thus the greatest potential to affect individual plants, followed by the modified proposed action. Because plant populations as a whole are not expected to be negatively impacted, the effective distinction between these effects is negligible. If burning leads to beneficial effects such as the maintenance of sparsely vegetated habitats or the reduction of fuel loads and subsequent reduction in the

potential for atypical, high-intensity fire, then the proposed action would see the highest acres of improvements. (Botany Report, p. 5, project record).

Rangeland Management and Noxious Weeds

Action Alternatives

Rangelands

The Proposed Action would positively affect both the short-term and long-term rangeland conditions by reducing the conifer density in stands, reducing ground fuel loading which restricts livestock movements and increasing transitory forage. Especially in those units that are currently timbered but would be accessible to cattle grazing after treatment (less than 35% slope, less than 1 mile from water). The proposed treatments would have a positive effect on rangeland conditions and increase available forage for livestock through nutrient cycling and forb releases after burning. There would be a temporary loss of forage during the treatment period due to temporary roads and treatment activities that may cause some displacement for livestock. In the short and long-term, livestock distribution should improve. (Rangeland Management and Noxious Weeds Report, p. 15, project record).

Prescribed broadcast burning over 1971 acres of grasslands and 2820 acres of forested lands in Alternative A and broadcast burning over 1508 acres of grasslands and 2497 acres of forested lands in Alternative B may impact timing and/or duration of livestock grazing. The burn should be coordinated with range staff and the permittees affected. Prescribed burns can increase plant palatability, availability and yield 3-4 years post-fire by removing old growth thus improving access to new growth. With adequate soil moisture, yields can increase due to baring and darkening the soil surface allowing it to warm more quickly and stimulating earlier growth (Stubbendieck et.al 2007). (Rangeland Management and Noxious Weeds Report, p. 15, project record).

Noxious Weeds

The Action Alternatives will likely result in a short-term increase in noxious weed acres of known species and may introduce new noxious weed species to the area. Increased vehicle and equipment use due to logging, thinning, and burning can act as weed spread vectors. Ground disturbance such as skid trails, landings, and 25 miles of temporary road construction will result in disturbed soils, providing ideal locations for noxious weeds to establish. The Three Mile Project area is relatively free of noxious weeds. There are small patches of spotted knapweed (Centaurea maculosa) in disturbed areas around tanks and along roadways (Table 28, below). Larger infestations occur in the Coleman Draw allotment in areas that were historically terraced and replanted with crested wheatgrass. A total of 542 gross acres are impacted by spotted knapweed with only 133 acres of actual infestation. The majority of these acres are within the Project Area Boundary but are outside any proposed treatment areas. There are no known infestations of other state listed noxious weeds in the Three Mile Project Area; though leafy spurge, houndstongue, and Canadian thistle exist on the Ashland Ranger District and are not fully inventoried. (Rangeland Management and Noxious Weeds Report, p. 15, project record).

Table 28: Alternatives A and B Weed species that pose the greatest threat.

Scientific Name	Common Name	Infested acres within the project area
Centaurea maculosa	Spotted Knapweed	133 acres

(See also Table 6 in the Rangeland Management and Noxious Weeds Report, project record).

Livestock Water Improvements

Table 29, below summarizes the effects of the alternatives on rangelands and noxious weeds. Under the two Action Alternatives, there would be an increase for potential damage or impact to livestock watering systems and fence lines within the project area. Increased traffic on roads, originally pioneered for pipeline installation and maintenance, could ultimately result in damage to both underground and above ground pipeline components. Damage to fences could occur with increased burning, thinning, and logging activities. General maintenance for normal wear and tear of the range improvements is assigned to the grazing permittee in the Term Grazing Permit.

Summary of Effects

Table 29: Summary of effects of alternatives on Range and Noxious Weeds

Analysis Indicator	No Action	Alternative A Proposed Action	Alternative B
Rangelands – Acres improved on Allotment	No effect short-term; Long-term loss of forage due to increased timber density, increased conifer encroachment in uplands.	Beneficial long-term effects on 6,624 acres due to improved livestock distribution, nutrient cycling due to burning, and opening up transitory range.	Beneficial long-term effects on 5.915 acres due to improved livestock distribution, nutrient cycling due to burning, and opening up transitory range.
Range Stock Water and Fence Improvements – Visible damage	No effect; Normal maintenance on existing water improvements and fences.	Potential risk of damaging existing stock water system and fences in project area due to logging, thinning and prescribed burning activities.	Potential risk of damaging existing stock water system and fences in project area due to logging, thinning and prescribed burning activities.
Noxious Weeds – Miles of Spread Vectors/Acres of Disturbance	Current infestation is estimated at 133 acres. No impacts from new ground disturbance and associated impacts from equipment/vehicle spread vectors along haul routes. The potential for noxious weeds to spread is always present due to biological dispersal methods as well as ongoing activities such as hunting, camping, grazing and other uses of the forest. This could result in an increase of noxious weeds under the No Action alternative. However, the No Action alternative should not result in any significant increases in the acres of noxious weeds within the project area.	Short-term increase of infested acres from project related activities along spread vectors over 25 miles or road. Increased potential for new noxious weed introduction and establishment in soil disturbance areas. Increased vehicle and equipment use due to logging, thinning and burning will result in disturbed soils, providing ideal locations for noxious weeds to establish. See Table 4 Project Design Criteria for mitigation measures and Table 5 for Monitoring Needs.	Short-term increase of infested acres from project related activities along spread vectors over about 25 miles or road. Increased potential for new noxious weed introduction and establishment in soil disturbance areas. Increased vehicle and equipment use due to logging, thinning and burning will result in disturbed soils, providing ideal locations for noxious weeds to establish. See Table 7 Project Design Criteria for mitigation measures and Table 8 for Monitoring Needs.

*Both Action Alternatives have similar effects to Rangelands, Stock Water and Fences, and Noxious Weeds. The difference would be that Alternative A would have more broadcast burning while Alternative B has slightly more logging and thinning acres with less burning.

Impacted Range Infrastructure and opportunity for Noxious Weed infestation would be essentially the same.

(See also Table 7 in the Rangeland Management and Noxious Weeds Report, pp. 16-17, project record).

No Action Alternative

Rangelands

Current permitted grazing practices would continue on all five allotments in the project area. The No Action alternative would have no direct impact to permitted livestock grazing. However, Ponderosa pine will continue to colonize into grassland systems and the process of fire in rangelands will be left to random wildfire events that may pose higher severity conditions in areas next to higher fuel loads. (Rangeland Management and Noxious Weeds Report, p. 18, project record).

Noxious Weeds

The potential for noxious weeds to spread is always present due to biological dispersal methods as well as ongoing activities such as hunting, camping, grazing and other uses of the forest. This could result in an increase of noxious weeds under the No Action alternative. However, the No Action alternative should not result in any notable increases in the acres of noxious weeds within the project area given the projected continued monitoring and treatment of current infestations as part of routine district weed management operations. (Rangeland Management and Noxious Weeds Report, p. 18, project record).

Livestock Water Improvements

Under the No Action alternative there would be no new damage or impact to livestock watering systems within the project area. General maintenance of the range improvements is assigned to the grazing permittee in the Term Grazing Permit. Normal wear and tear to the watering systems and fences is expected. (Rangeland Management and Noxious Weeds Report, p. 19, project record).

Summary of Cumulative Effects

Rangelands

Historically, over utilization by livestock was common within the project area. For specific dates and changes in allotment management refer to the existing condition section of this report. However, cross-fencing, rotation systems and stocking rate reductions over time have improved conditions. The most recent NEPA analysis and decisions were completed in 1996, 1998, and 2008. Current grazing practices under existing allotment plans have improved rangeland resources and repaired some of the past problems. Combined with Alternative A or Alternative B, the rangeland should see additional positive effects. (Rangeland Management and Noxious Weeds Report, p. 18, project record).

This project would treat forested stands by logging, thinning and burning, increasing transitory range and acres for improved livestock distribution on about 6,000 acres. Prescribed burning of the upland range would improve forage accessibility and palatability, impacting livestock distribution in the short-term and improving rangeland health. Short-term access restriction

would affect livestock in treatment areas. The cumulative effects of past and ongoing activities combined with Alternative A or Alternative B would result in an increase in the transitory range availability and improved livestock distribution in all affected allotments. (Rangeland Management and Noxious Weeds Report, p. 18, project record).

Livestock-grazing is a socially and economically accepted disturbance in the Ashland region because it is the primary and nearly exclusive economy. Fire is also a socially accepted disturbance in the Ashland region because it is recognized as the primary means for grassland maintenance in this pine/prairie ecosystem where the Ponderosa Pine plays such a limited role economically (USDA 2014). (Rangeland Management and Noxious Weeds Report, p. 18, project record).

Noxious Weeds

Existing weed infestations would be contained to their current locations under the current Ashland Ranger District weed treatment program. Noxious weeds are being treated with herbicide and will continue to be managed. Monitoring for weeds on disturbed sites will continue. Once noxious weeds are present in the ecosystem there is always a risk that they could spread even without a disturbance which can have some level of risk on other resources and/or uses such as soil and water values and overall ecosystem health and function. (Rangeland Management and Noxious Weeds Report, p. 18, project record).

Weeds are spread via many vectors and it is nearly impossible to prove that one vector is the only source. It is likely that past recreation and ungulate use has introduced or spread weeds into various parts of the analysis area. It is likely that past, present and reasonably foreseeable use of the area for vegetation management activities, and by cattle, wildlife and recreationists may relocate seeds. Continued weed monitoring and treatment over time have kept the weed infestations to a low amount at the present time. While previous actions may have contributed to the spread of weeds, the No Action Alternative would have a minimal effect on weeds (limited disturbance of existing weeds), consequently, there are limited cumulative effects. (Rangeland Management and Noxious Weeds Report, p. 18, project record).

Under Alternative A and Alternative B, noxious weeds are expected to increase due to the project activities, and combined with the cumulative effects of past activities and other ongoing activities, areas of noxious weeds would likely increase and new species of noxious weeds could be introduced to the area. Mitigation measures to inventory and control noxious weed infestations following project implementation are designed to control any increase in acres or introduction of new species in the long-term. (Rangeland Management and Noxious Weeds Report, p. 18, project record).

In the project area the current weed density has been kept at very low levels over the past 30 years because of an effective weed treatment program. There is the potential for the weed density to increase due to the project; however that is very unlikely because the mitigation measures and follow-up monitoring/treatment will help to keep pressure on new and existing weed patches. Over time, thinned vegetation will re-colonize the sites and out-compete most of the weeds for resources. These shaded areas are not very conducive to many weeds species in the long term. There are no new permanent roads proposed for this area. Temporary roads, skid trails and decommissioned roads may become infested with weeds. Follow-up monitoring/weed treatments will help to reduce the weed density. Also, the remaining trees provide some shade and new

seedlings will become established, which will provide more competition for sunlight over time. (Rangeland Management and Noxious Weeds Report, p. 19, project record).

The Ashland Ranger District has had an active weed control program for at least the past 30 years. The District has mapped all known weeds and assigns a treatment schedule and management strategy to help ensure a long term and consistent treatment program. Each treatment site is monitored to review the effectiveness of treatment, measured in terms of percent and documented in FACTs database. (Rangeland Management and Noxious Weeds Report, p. 19, project record).

Livestock Water Improvements

The action alternatives would have an increase for potential damage or impact to livestock watering systems and fence lines within the project area. Increased traffic on roads, haul routes, and along skid trails could result in damage to pipeline components. Damage to fences could occur with increased burning, thinning, and logging activities. (Rangeland Management and Noxious Weeds Report, p. 19, project record).

General maintenance for normal wear and tear of the range improvements is assigned to the grazing permittee in the Term Grazing Permit. These improvements have been in place for over 40 years and some of the water systems are very intricate in nature. If certain components are damaged, entire systems may become nonfunctional. In these instances, grazing rotations and livestock wellbeing may be in jeopardy if the damage in not repaired quickly. (Rangeland Management and Noxious Weeds Report, p. 19, project record).

Cultural Resources

Effects Common to Action Alternatives

Any treatment involving ground disturbing activities such as timber harvesting, log landing use, machine mastication and piling, and prescribed burning would have the potential to directly or indirectly affect cultural resources. Road improvement, reconstruction, realignment, decommissioning, and temporary road construction and obliteration are additional examples of activities that may directly affect cultural resources by altering or changing their existing character or integrity. Effects to cultural resources vary according to the magnitude of fuel reduction and forest health treatment activities dictated by alternative. (Cultural Resources Report, p. 15, project record).

The CGNF operates under a site identification protocol called the “Wildland Urban Interface and Large Scale Hazardous Fuels Reduction Site Identification Strategy (SIS) which has been applied to several large-scale projects and has worked well for many years. Integral to the Threemile Restoration and Resiliency Project is the use of the SIS as a proactive approach that that would ultimately benefit cultural resources by treating pine stands and reducing fuel loads on the sites. This approach calls for the inclusion of the heritage sites in the proposed activity areas rather than avoiding the site by modifying the timber and/or fuel treatment boundary to exclude the site. It also eliminates the creation of “untreated islands or donuts” within the treatment areas. All sites would be avoided by ground disturbing harvest and fuel treatment activities, but where feasible, trees that may damage the sites or contribute to increased fuels would be removed without disturbing the sites. (Cultural Resources Report, p. 3, project record).

Archaeological site treatments that can be utilized under the SIS include clearing of brush and downed timber, and selective removal of green, dying, and dead trees. Site treatment will be individually designed for each site located within treatment boundaries and implemented prior to harvest and/or fuel treatment activities. Treatments will only be conducted in conditions where no ground disturbance would occur, and under the direct supervision of a Forest Archaeologist. Treated sites will be monitored throughout the life of the project to measure the success of the treatment and ensure the site is protected. Since the approach is individually prescribed and does not allow any ground disturbance within the site boundaries, no adverse effects to known sites is anticipated. (Cultural Resources Report, p. 15, project record).

Alternatives A and B

Direct and Indirect Effects

Under Alternative A sixty-four cultural sites, and in Alternative B sixty-six sites within the Threemile Restoration and Resiliency Project – Area of Potential Effect would become more "fire resistant" through SIS site treatments. Tables 3 and 6 in the Cultural Resources Report display-proposed site treatments in both action alternatives. These treatments would avoid, reduce, or remove adverse effects to sites located within the proposed treatment areas. (Cultural Resources Report, pp. 16-18, and 22-24, respectively, project record).

The sixty-four sites in Alternative A, and the sixty-six sites in Alternative B are located within units proposed for either commercial harvest, prescribed burning, or a combination of the two treatments. No ground disturbing, log landing, or pile burning activities would occur on or within the perimeters of any of the sites. Site treatments—such as tree removal utilizing mechanical equipment from along site perimeters or heavy fuel loading removal by hand—would be individually designed prior to harvest or fuel treatment and would occur under the direct supervision of, and with on-site monitoring by, the Forest Archaeologist. These treatments, conducted without ground disturbance, would benefit the majority of the sites under these alternatives, since they include non-combustible features or materials such as cairns, dams/reservoirs, lithic scatters, quarries, roads, and stone arcs/circles. (Cultural Resources Report, pp. 19-26, project record).

Three sites—including the remains of a CCC spike camp (24PR2107), a depression with an adjacent log/post pile (24PR2109), and the Yager Butte Fire Lookout (24PR2498)—contain combustible materials and would be avoided by ground disturbing and prescribed burning activities. The Olaf Kelly Homestead site (24PR1961) was recorded in 2000 and included several farm implements abandoned on Forest Service administered land. These implements have since been removed by the adjacent landowner and no longer represent a concern for proposed prescribed burning activities. One historic petroglyph site (24PR2105) would be monitored during commercial tree harvest activity to insure the site is not disturbed. (Cultural Resources Report, pp. 19-26, project record).

In both action alternatives portions of seventeen existing National Forest System Roads (NFSR) are proposed for use during the Threemile Restoration and Resiliency Project. These roads require maintenance—such as blading, drainage re-establishment, realignment, spot surfacing, turnout construction, and widening—in order to accommodate heavy equipment and logging truck traffic. This proposed road maintenance will avoid twenty-one sites or, if site avoidance is not possible then the sites will be evaluated in consultation with the MTSHPO prior to signing of

the Decision Notice. Table 4 and Table 7 in the Cultural Resources Report (pp. 19-20, and 25-26) summarizes the site treatment stipulations for the twenty cultural sites that are adjacent to, or are bisected by, these roads and the stipulations for their treatment. (Cultural Resources Report, project record).

There is proposed construction of 28.3 miles of temporary roads under Alternative A would that would affect six cultural sites (Culture Resource Report, Table 5, p. 20). These proposed temporary road locations have not yet been ground-truthed/finalized, therefore their final flagged/staked locations would be reviewed by a Forest Archaeologist and shifted prior to implementation in order to avoid the six sites. (Cultural Resources Report, project record).

There is proposed construction of 26.0 miles of temporary roads under Alternative B that would affect one cultural site (Cultural Resource Report, Table 8, p. 26). This proposed temporary road location has not yet been ground-truthed/finalized, therefore its final flagged/staked location would be reviewed by the Forest Archaeologist and shifted in order to avoid the site. (Cultural Resources Report, project record).

Under both Alternatives A and B, approximately 2.1 miles of Lemonade Road #4703 (24PR2031) are proposed for decommissioning following implementation of the Threemile Restoration and Resiliency Project. The Lemonade Road #4703/#4362—coursing approximately 14.2 miles in length in a north-south direction from U. S. Highway 212 to Ten Mile Road #4092—was determined Eligible for nomination to the NRHP under criteria a and c in consultation with the MTSHPO in 2006 (Wilmoth 2006). In addition to retaining much of its historic alignment, there are four historic drainage crossing structures exhibiting dry-laid/hand-placed stone construction along with an associated water diversion ditch that exemplify the road's historic character. (Cultural Resources Report, pp. 20 and 26, project record).

The 2.1 mile segment proposed for decommissioning consists of a sinuous, single-lane road varying from 12-20 feet in width and exhibits slope-cut or contouring construction, drainage ditch installation, and evidence of past scoria gravel surfacing. There are at least five small-diameter squash culvert and one cattleguard present. Proposed decommissioning would include removal of the existing cattleguard and the five squash culverts, recontouring/chiseling/seeding the roadbed, and blocking the route to prevent motorized vehicle use. Consultation with the MTSHPO would occur prior to this proposed road segment decommissioning. (Cultural Resources Report, pp. 20 and 26, project record).

Any new proposed additions or changes—such as unit reconfiguration or treatment prescription, log landing areas, existing NFSR maintenance, or temporary road construction—under Alternative A would be reviewed by the Forest Archaeologist prior to implementation in order to insure cultural resources would not be affected. (Cultural Resources Report, pp. 20 and 26, project record).

Proposed prescribed burning and planting areas that have not been inventoried for cultural resources would be inventoried prior to implementation. (Cultural Resources Report, pp. 26, project record).

Cumulative Effects

The cumulative effects of Alternatives A and B would be the restoration of portions of the Threemile Restoration and Resiliency Project Area towards a mosaic of forest, woody draw, and grasslands vegetation that restores and improves ecosystem resiliency. Through the implementation of proposed site treatments, this alternative would preserve and protect sixty-four (33 %) of the recorded cultural resources within the Threemile Restoration and Resiliency Project Area perimeter, and includes the cultural resources as an integral part of the future "more resilient" Threemile landscape. It is also consistent with Forest Plan direction "…to maintain and enhance historic and prehistoric cultural resource values. Conservation of archaeological and historic sites and information for research, public interpretation, and use by future generations is emphasized." (USDA-FS 1986: 4). (Cultural Resources Report, pp. 21 and 26, project record).

There remain, however, 128 cultural sites in Alternative A, and 126 cultural sites in Alternative B, that are outside of the proposed treatment units that would remain at risk from wildfire and fire suppression activities. Reducing the occurrence of large wildfires within the Threemile Restoration and Resiliency Project Area would result in the reduction in the number of cultural resources directly affected by exposure, damage, or destruction following a wildfire event and reduction in indirect effects to cultural sites from exposure, vandalism, and illicit artifact collecting resulting in the loss of valuable information contained within cultural sites. (Cultural Resources Report, pp. 21 and 26, project record).

Under Alternatives A and B, twenty cultural sites would either be avoided by proposed maintenance—such as blading, drainage re-establishment, realignment, spot surfacing, turnout construction, and widening—on existing National Forest System Roads in order to accommodate heavy equipment and logging truck traffic routes use during implementation of the project or they would be consulted on with the MTSHPO. Under Alternative A, six cultural sites would be avoided by proposed temporary road construction, whereas one would be avoided in Alternative B. (Cultural Resources Report, pp. 21 and 26, respectively, project record).

Conclusion

Through implementation of proposed site treatments both action alternatives would preserve and protect the recorded cultural resources within the Threemile Restoration and Resiliency Project Area perimeter, sixty-four sites in Alternative A, and sixty-six sites in Alternative B. In doing so, this includes the cultural resources as an integral part of the future "more resilient" Threemile landscape. It is also consistent with Forest Plan direction "…to maintain and enhance historic and prehistoric cultural resource values. Conservation of archaeological and historic sites and information for research, public interpretation, and use by future generations is emphasized." (USDA-FS 1986: 4). (Cultural Resources Report, pp. 21 and 26, respectively, project record).

In both action alternatives, twenty cultural sites would either be avoided by proposed maintenance—such as blading, drainage re-establishment, realignment, spot surfacing, turnout construction, and widening—on existing National Forest System Roads in order to accommodate heavy equipment and logging truck traffic routes use during implementation of the project or they would be consulted on with the MTSHPO. Six cultural sites would be avoided by proposed temporary road construction in Alternative A, and one cultural site would be avoided in Alternative B. (Cultural Resources Report, pp. 21 and 26, respectively, project record).

However, there remain, 128 cultural sites outside of the proposed treatment units that would remain at risk from wildfire and fire suppression activities, in Alternative A, and 126 sites under Alternative B. (Cultural Resources Report, pp. 21 and 26, respectively, project record).

Comparison of Alternatives

Comparisons of the two action alternatives is summarized below in Table 30, below.

Table 30. Comparison of Alternative A and Alternative B

	Alternative A	Alternative B
Cultural sites treated within units	64	66
Cultural sites avoided by NFSR routes	20	20
Cultural sites avoided by temporary roads	6	1

(See also Table 9 in the Cultural Resources Report, project record).

Alternative C – No Action

Under this alternative no treatment activities would occur, no temporary roads would be constructed, and approximately 2.1 miles of the existing NFSR Lemonade Road #4703 would not be decommissioned. Normal on-going activities would still occur such as recreation, livestock grazing, road maintenance, hunting, and wood gathering. In the short-term no impacts would occur on any heritage sites. However, in the long-term, without some sort of active management to reduce the risk of wildfire and establish more resilient ecosystems, the probability of a large wildfire is likely in the area. Burning of pine stands and hazardous fuel loads on, and the construction of fire suppression dozer lines through, any existing heritage sites in association with wildfire events could cause the loss of important archaeological information. In addition, after a large wildfire vandalism and illegal artifact collection may increase with the new exposures of sites through erosion and lack of vegetative cover, and improved access and damage by dozer lines constructed during fire suppression efforts. Essentially, without some type of proactive site protection, 192 cultural resource sites would remain at risk from wildfire and fire suppression activities. (Cultural Resources Report, p. 14, project record).

Tribal Consultation

Tribal consultation was conducted during the spring of 2018 in order to present the Threemile Restoration and Resiliency Project and to discuss any concerns, comments, or requests the tribes may have regarding cultural resources within this project area. (Cultural Resources Report, p. 28, respectively, project record).

Transportation

Temporary Roads

Table 31 below displays the proposed miles of temporary road construction for each alternative. Alternative A has approximately 28.3 miles of temporary roads and Alternative B has approximately 26 miles of temporary roads. Temporary roads would be constructed to the minimum standards necessary for log hauling on National Forest System roads. All newly constructed or reconstructed temporary roads would be reclaimed after the project is completed or as soon as logistically practical. The reclamation of temporary roads would include: Re-

contouring; scarifying; installing erosion control features where needed; revegetation with native seed mix; placing woody debris on template; blocking entrance to roads as necessary; and/or removing all culverts. (Transportation Specialist Report, pp. 5-6, project record).

Alternatives A and B

The current road system would require reconstruction along most routes, and certain road segments would require realignment in order to accomplish project work. There are many sections of road that are too steep and will require the road to be realigned in order to meet log haul requirements. (Transportation Specialist Report, pp. 5-6, project record).

Many of the ML2 Open for Administrative Use roads have pipelines that follow, more or less, the road corridor. Reconstruction and realignment of these routes may require either realigning the road or realigning the pipeline. (Transportation Specialist Report, pp. 5-6, project record).

See Table 31 below, Road and Trail miles by Alternative and Table 32. Activity Type by Alternative for road miles. Specific information for each road is shown in Appendix A of the Transportation Specialist Report, project record. (Transportation Specialist Report, pp. 5-6, project record).

Table 31. Road and Trail Miles by Alternative

System	Miles within the project boundary	Alternative A (Log Haul)	Alternative B (Log Haul)
Three Mile Project Area			
NFSR - NATIONAL FOREST SYSTEM ROAD	33.9		
ML2 Admin	20.3	8.2	7.6
ML2 Open	4.5	0.3	0.3
ML3	9.1	5.9	5.9
MOTORIZED TRAILS			
Trail Open	18.7	9.9	9.9
TEMPORARY ROADS		28.3	26
COUNTY JURISDICTION	4.5	4.5	4.5

(See also Table 2 in the Transportation Specialist Report, project record).

Table 32. Activity Type in Miles by Alternative

Roads/Trails	Alternative A	Alternative B
Temporary Road - Construction/Obliteration	28.3	26
Exiting Road - Maintenance	14.4	13.8
Exiting Road - Reconstruction	14.1	13.5
Existing Motorized Trail - Decommission	2.1	2.1
Motorized trails to be converted to Maintenance level 2 roads during the project; To be returned to motorized trails upon project completion.	9.9	9.9

(See also Table 3 in the Transportation Specialist Report, project record).

Road Decommissioning

There are approximately 2.1 miles of existing motorized trail decommissioning. This section will be converted to a ML2 road during the project and then decommissioned at the end of the project when logistically feasible. This is defined as activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1), (FSM 7703). (Transportation Specialist Report, pp. 7-8, project record).

Decommissioning removes roads from the landscape that are no longer needed for current or future resource management or which pose a threat to water quality or wildlife security. This action would restore the natural drainage patterns interrupted when the roads were constructed. These methods for decommissioning include active and passive restoration. The methods used to decommission roads will be based on site conditions and will be designed for minimal new ground disturbance whenever possible. Passive treatment would not involve ground disturbing work. Active decommissioning is would be required for this road segment. Active treatment is anticipated and could include:

- Total re-contouring that would restore the road template to the natural hill slope,
- Partial re-contouring to fill ditches or remove unstable road shoulders, remove cattleguards, remove culverts, and other drainage structures,
- Ripping the roadbed to reduce compaction,
- Installing water bars to reduce erosion,
- Seeding disturbed soil, and
- Placing woody debris
- Blocking the road entrance.

(Transportation Specialist Report, pp. 7-8, project record).

Road Reconstruction

There are approximately 14.1 miles (Alternative A) and 13.5 miles (Alternative B) of road reconstruction proposed. Reconstructing roads would include horizontal and vertical road realignment to meet BMPs and current design standards for roads, blading and shaping the road prism, ditch and drainage reestablishment, spot aggregate/scoria placement, clearing and grubbing, excavation, culvert installations, drainage dip installation, and other various reconstruction methods used to create a safe road suitable for its recommended purpose. Reconstruction template would be either a 12'-14' road with ditch or a 14' in sloped road with a ditch. Additional turnouts, drainage structures and spot surfacing would be added as identified in design. (Transportation Specialist Report, p. 8, project record).

Reconstruction and Maintenance activities will focus on ensuring Best Management Practices (BMP's) are being met. Planned road reconstruction will improve the existing roads to the standard necessary for the anticipated use. (Transportation Specialist Report, p. 8, project record).

All roads utilized for commercial treatments and open to the public would require pre-, during, and post- haul maintenance. (Transportation Specialist Report, p. 8, project record).

Heritage

There are known heritage sites in the vicinity of some roads. The records of the locations of these heritage sites in relation to the roads are contained in the project record and not subject to release under the Freedom of Information Act (FOIA) pursuant to Exemption 3, Information Specifically Exempted by Other Statutes, in this case National Historic Preservation Act (5 USC 552(b)(3). Any reconstruction or realignment will be coordinated with Heritage Resources. (Transportation Specialist Report, p. 8, project record).

Economics

Project Feasibility

The estimation of project feasibility was based on the Region 1 sale feasibility model, which is a residual value timber appraisal approach that takes into account logging system, timber species and quality, volume removed per acre, lumber market trends, costs for slash treatment, and the cost of specified roads, temporary roads and road maintenance. The appraised stump. rate from the feasibility analysis was compared to base rates. In this case the minimum rate of $3.00 per hundred cubic feet (CCF) was used. The appraised stump. rate and base (minimum) rates for each alternative are displayed in Table 33, below. For Alternative B and C, the appraised stump. rate is higher than the base rate, indicating that Alternative B is feasible (likely to sell). (Economic Specialist Report, p. 7, project record).

Financial Efficiency

The financial efficiency analysis is specific to the timber harvest and restoration activities associated with the alternatives (as directed in Forest Service Manual 2400-Timber Management and guidance found in Forest Service Handbook 2409.18). Costs for sale preparation, sale administration, regeneration, and restoration activities are included. All unit costs, quantities, and timing of activities were developed by the specialists on the project's interdisciplinary team. If exact costs were not known, the maximum of the cost range was used to produce the most conservative PNV result. If actual costs are lower, all else equal, PNV would be higher than the

estimates. The expected revenue for each alternative is the corresponding predicted high bid from the sale feasibility analysis multiplied by the quantity of timber to be harvested. The predicted high bid is used for the expected revenue (rather than the appraised stump. rate) since the predicted high bid is the best estimate of the high bid resulting from the timber sale auction. The PNV was calculated using a 4% real discount rate over the two year project lifespan (2018-2019). For more information on the values or costs, see the project file. (Economic Specialist Report, p. 7, project record).

This analysis is not intended to be a comprehensive benefit-cost or PNV analysis that incorporates a monetary expression of all known market and non-market benefits and costs that is generally used when economic efficiency is the sole or primary criterion upon which a decision is made. Many of the values associated with natural resource management are best handled apart from, but in conjunction with, a more limited benefit-cost framework. These values are discussed throughout the Environmental Assessment, for each resource area. (Economic Specialist Report, p. 7, project record).

Table 33, below, summarizes project feasibility and financial efficiency, including the base rates, appraised stump. rate, predicted high bid, total revenue, and PNV for each alternative. Because not all costs of the project are related to the timber sales, two PNVs were calculated. One PNV indicates the financial efficiency of each alternative, including all costs and revenues associated with the timber harvest and required design criteria. A second PNV includes all costs for each alternative with the required design criteria and for the timber harvest and all other resource activities. The cost of sale preparation ($12.50 per CCF) and sale administration ($8.50 per CCF) are considered in PNV for all alternatives. (Economic Specialist Report, p. 7, project record).

Results shown in Table 33 indicate that Alternative B is financially efficient (positive PNVs) for the timber harvest with designed criteria. Some of the costs associated with Alternative B include road maintenance, amount of temporary roads and obliteration. (Economic Specialist Report, p. 7, project record).

Table 33, below (see Table 2 in the Economic Specialist Report, project record), also indicates that Alternatives B and C, the action alternatives, are financially efficient (positive PNV) for timber sale with designed criteria and other resource activity. The No Action Alternative has no costs or revenues associated with it. (Economic Specialist Report, p. 7, project record).

A reduction of PNV in any alternative as compared to the most efficient solution is a component of the economic trade-off, or opportunity cost, of achieving that alternative. The no action alternative would not harvest or take other restorative actions and, therefore, would incur no costs. As indicated earlier, many of the values associated with natural resource management are non-market benefits. These benefits should be considered in conjunction with the financial efficiency information presented here. These non-market values are discussed in the various resource sections found in this the environmental assessment. (Economic Specialist Report, p. 8, project record).

When evaluating trade-offs, the use of efficiency measures is one tool used by the decision maker in making the decision. Many things cannot be quantified, such as safety, effects on wildlife and the restoration of watersheds and vegetation. The decision maker takes many factors into account in making the decision. (Economic Specialist Report, p. 8, project record).

Table 33. Project Feasibility and Financial Efficiency Summary (2017 dollars)

Measure	No Action	Alt A	Alt B
Acres Harvested	0	3,013	3,160
Volume Harvested (CCF)	0	25,555	26,465
Base Rates ($/CCF)	$0	$3.00	$3.00
Appraised Stump. Rate ($/CCF)	$0	$3.01	$3.61
Predicted High Bid ($/CCF)	$0	$8.66	$9.26
Total Revenue (Thousands of $)	0	$185	$206
PNV (Thousands of $)	$0	$158	$177

(See also Table 2 in the Economic Specialist Report, project record).

Economic Impact Effects

This analysis calculated the jobs and labor income associated with the processing of the timber products harvested and conducting other resource activities not tied to commercial sales. Timber products harvested from the proposed project and the non-timber activities would have direct, indirect, and induced effects on local jobs and labor income. To estimate jobs and labor income associated with timber harvest, this analysis assumed only saw timber would be harvested from this project. In order to estimate jobs and labor income associated with reforestation and restoration activities, expenditures for these activities were developed by resource specialists experienced with each type of activity. Only the expenditures associated with the contracted activities are included in the impact analysis. (Economic Specialist Report, p. 8, project record).

A job (as defined in IMPLAN) is an annual average of monthly jobs. This is a standard convention and consistent with methods used by the U.S. Bureau of Labor Statistics. When jobs are counted this way, one cannot tell from the data the number of hours worked or the proportion that are full or part-time or anything about seasonality; only that they are yearlong. These jobs are different than full time equivalent (FTE) jobs. (Economic Specialist Report, p. 8, project record).

Table 34 below displays the direct, indirect and induced, and total estimates for employment (part and full-time) and labor income that may be attributed to each alternative. Since the expenditures occur over time, the estimated impacts of jobs and labor income would be spread out over the life of the project. It is important to note that these may not be new jobs or income, but rather jobs and income that are supported by this project. These impacts are shown both in total (over the life of the project) and on an annual basis. It is anticipated that the timber harvest would occur over a four-year period. (Economic Specialist Report, p. 8, project record).

Table 34. Estimated Economic Impacts

	No Action	Alt A	Alt B
Direct Jobs	0	31	32
Indirect and Induced	0	13	14
Total	0	44	46
Direct Labor Income ($Thousands)	$0	$1,423	$1,473
Indirect and Induced ($Thousands)	$0	$877	$909
Total ($T)	$0	$2,300	$2,382

(See also Table 3 in the Economic Specialist Report, project record).

Environmental Justice

As stated in Executive Order 12898, it is required that all federal actions consider the potential of disproportionate effects on minority and low-income populations in the local region. The principals of environmental justice require agencies to address the equity and fairness implications associated with Federal land management actions. The Council on Environmental Quality (CEQ) (1997) "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis." Table 35 shows that the total share of all minority populations represented less than 10 percent of the population within each county, the combined county affected area, as well as in the state. Thus, the U.S. Census data suggest minority populations within the analysis area do not meet the CEQ's Environmental Justice criterion. (Economic Specialist Report, p. 9, project record).

Table 35. County region population by Race, 2016.

	Powder River County	Meade County	Pennington County	Lawrence County	County Region	U.S.
White alone	95.9%	90.1%	83.2%	93.2%	86.0%	73.3%
Black or African American alone	0.0%	1.8%	1.3%	1.0%	1.3%	12.6%
American Indian alone	1.3%	2.6%	8.7%	2.8%	6.7%	0.8%
Asian alone	0.0%	1.2%	1.1%	1.0%	1.1%	5.2%
Native Hawaiian & Other Pacific Is. alone	0.0%	0.1%	0.0%	0.0%	0.0%	0.2%
Some other race alone	0.0%	1.2%	0.6%	0.5%	0.7%	4.8%
Two or more races	2.8%	3.0%	5.1%	1.4%	4.2%	3.1%

(See also Table 4 in the Economic Specialist Report, project record).

Poverty is an important indicator of economic well-being. For public land managers, understanding the extent of poverty is important for several reasons. First, people with limited income may have different needs, values, and attitudes as they relate to public lands. Second, proposed activities on public lands may need to be analyzed in the context of whether people who are economically disadvantaged could experience disproportionately high and adverse effects. (Economic Specialist Report, p. 9, project record).

Poverty rates are often reported in aggregate, which can hide important differences. Table shows poverty for various types of individuals and families. This is important because aggregate

poverty rates (for example, families below poverty) may hide some important information (for example, the poverty rate for single mothers with children). (Economic Specialist Report, p. 9, project record).

This project is not expected to have any economic negative effect on the population within the affected area. (Economic Specialist Report, p. 9, project record).

The Executive Order also directs agencies to consider patterns of subsistence hunting and fishing when an action proposed by an agency has the potential to affect fish or wildlife. The project is not expected to negatively impact wildlife species traditionally depended on for subsistence hunting/fishing activities (see Wildlife section). (Economic Specialist Report, p. 10, project record).

Table 36. County region poverty, 2016

	Powder River County	Meade County	Pennington County	Lawrence County	County Region	U.S.
People	1,608	26,004	104,514	23,912	156,038	310,629,645
Families	488	7,420	26,828	6,562	41,298	77,608,829
People Below Poverty	124	2,353	14,402	2,873	19,752	46,932,225
Families below poverty	10	453	2,398	426	3,287	8,543,087
People Below Poverty %	7.7%	9.0%	13.8%	12.0%	12.7%	15.1%
Families below poverty %	2.0%	6.1%	8.9%	6.5%	8.0%	11.0%

Summary of Effects

No Action

The No Action alternative would not harvest timber, implement BMPs on haul routes, or take other restorative actions and, therefore, incurs no financial costs. It would also produce no revenue and have no effects on jobs or income. The public would not incur costs, nor realize benefits of timber harvest in this area. However, a significant NEPA planning cost for this alternative will have already been incurred, representing a sunk cost. (Economic Specialist Report, p. 10, project record).

The No Action alternative has the potential to continue the decline of timber-related employment in the rural communities of the economic impact area. Continued decline in timber harvest from National Forest System lands could potentially impact wood product employment and associated indirect and induced employment. Cumulative loss in timber-related jobs could affect the remaining infrastructure and capacity of the local rural communities, and could disrupt the dependent local goods and service industries. (Economic Specialist Report, p. 10, project record).

Alternatives A and B

Implementation of Alternative A would harvest timber and provide commodity generated revenue and would expend government funds to conduct restoration work. The action alternative will recover the economic value of forest products in a timely manner and contribute income and employment within the county region. (Economics Report, p. 10, project record).

Recreation and Scenery

All the recreation activities occurring within the project area are of a dispersed nature, predominately hunting (MVUM, FPR Recreation assessment), and Off Highway Vehicle use within the project area. OHV use is confined to designated routes pursuant to the Ashland Travel Management decision (USDA, 2009). Per the Ashland Travel Management decision, dispersed vehicle camping is allowed up to 300 feet on either side of a designated route. As noted in the Transportation section, pursuant to contractual requirements, temporary roads are not open to the public, but are open to the contractor and Forest Service personnel in the conduct of the management of the Forest.

Impacts to recreation from vegetation treatments would be temporary, short-term in duration and limited in scope and effect to the time periods project implementation activities are occurring. Forest visitors, permittees, and Forest personnel could expect temporary delays to travel depending on where within the project area and the time of year that project implementation is occurring. The activity related to this project would be visible to recreationists in the foreground as they travel throughout the area for a few years after the work is done. This may reduce the short-term desirability, for some people, for recreating in this area. Following implementation of all project-related activities, the scenery impacts to dispersed recreationists or other viewers would diminish over time.

Due to the existing patchy vegetation mosaic within the project area (as has been described above and in in several resource reports) and nature of this project work, the resulting vegetation patterns would appear similar to those created by historic fire activity. The long-term effects to the scenery across the project area, from critical viewing platforms in highly-valued viewsheds, would be positive and meet Forest Plan standards for scenery. Due to the overall increase in the diversity of species, textures, age classes, structure, and patterns – the project would provide a more sustainable scenery condition. (Personal communication and screen sharing with Forest Landscape Architect, May 2018).

Under no action, no activities proposed in the action alternatives would take place. That means that all the on-going and into the foreseeable future actions described in the past, present, and foreseeable future section would continue. There is an existing patchy vegetation mosaic within the project area that would continue, as has been described. However, the landscape within the project area for the Threemile Restoration and Resiliency Project would be at greater risk for stand replacing fire and would not meet any of the purposes for which the Forest Service proposed taking action.

Agencies and Persons Consulted

The Forest Service consulted with the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Ross & Fay Denson
Rich Mitchell, Brian Creek Cattle Co.
Jacqueline Trusler
Patsy Fitch
Dan & Marcy Davis
Daniel Cahoon
Evangeline M. Leveque, Trustee
Russell Greenwood
Harold & Norma Hanson
Dennis Denson
Teresa Newcomer
Donald Purdon

Lawrence D. Kobielusz
Samuelson Ranch
Jeanette Lei
John L. Riley
Knudson Ranch Co.
Marian Hanson
Tim Fortner
Sam Scott, Brian Creek Cattle Co.
Jim & Cindy Goodwin
Dana & Lawretta Miller
Thane & Sandy Thomas
Lucille Otteson
John Lei
William D. Zier
Mello-D Ranch LLC
Jackie Musgrove
Tom W. & Suzanne Trusler
Home Creek Cattle Co. LLC
Tim Blaede
Brad Schmitz, Montana FWP
Governor Steve Bullock
Rae Peppers, MT House of Rep.
Darrell Brabec, Colstrip Sportsman Club
Rocky Mtn. Elk Foundation
Sara Jane Johnson
Fox Lumber
Jace Killsback, President, Northern Cheyenne Tribe
Ark Land Company
Bryan Tarter
Honorable Jon Tester
Sam Demaray, Ashland Forest Products
Jason Small, Montana Senate
Ed Joiner, Chairman, Rosebud Co. Commissioners
Collin W. Smith, National Wild Turkey Fed.
Mike Garrity, Alliance for the Wild Rockies
Neiman Timber
Teanna Limpy, THPO, Northern Cheyenne Tribe
Dudley Shy, Shy Cattle Co. LLC
Chris Pileski, DNRC
Honorable Steve Daines
Honorable Greg Gianforte
Darold Zimmer, Chairman, Powder River Co. Commissioners
Vester Wilson, Mule Deer Foundation
Eli Shuford
Brandi Scone, Biologist, Montana FWP
Alan Tarter
Ken Markee